

22nd European Conference on Research Methodology for Business and Management Studies

ECRM 2023



Hosted by the Iscte – Instituto
Universitário de Lisboa, Portugal

6 September 2023

Edited by
Prof Florinda Matos and Prof Álvaro Rosa

Proceedings of the

**22nd European Conference on Research
Methodology for Business and Management
Studies**

ECRM 2023

A Conference Hosted By

**ISCTE – Instituto Universitário de
Lisboa, Portugal**

6 September 2023

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ECRM Preface

These proceedings represent the work of contributors to the 22nd European Conference on Research Methodology (ECRM 2023), hosted by Iscte – Instituto Universitário de Lisboa, Portugal on 6 September 2023, Lisboa, Portugal. The Conference Chair is Prof Florinda Matos, and the Programme Chair is Prof Álvaro Rosa, both from Iscte Business School, Iscte – Instituto Universitário de Lisboa, Portugal.

ECRM is a well-established event on the academic research calendar and now in its 22nd year the key aim remains the opportunity for participants to share ideas and meet. The scope of papers will ensure an interesting conference. The subjects covered illustrate the wide range of topics that fall into this important and ever-growing area of research.

The opening keynote presentation is given by Mr Luiz De Mello, Director of the Policy Studies Branch at the Economics Department of the OECD, Paris, France, with the title of, Meeting the climate change challenge: How is it shaping economic policy research?

With an initial submission of 90 abstracts, after the double blind, peer review process there are 31 Academic research papers, 4 PhD research papers, 1 Masters Research paper and 2 work-in-progress papers published in these Conference Proceedings. These papers represent research from Brazil, Austria, China, Estonia, Finland, Germany, Israel, Italy, Kenya, Nigeria, Pakistan, Russia, Saudi Arabia, Slovakia, South Africa, Sweden, Switzerland, Taiwan, UAE, Uganda and the United Kingdom.

We hope you enjoy the conference.

Prof Florinda Matos

Iscte – Instituto Universitário de Lisboa
Portugal
September 2023

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Conference and Programme Chairs



Florinda Matos is a Professor at ISCTE - University Institute of Lisbon. She is the founder and president of the Intellectual Capital Association (ICAA), whose mission is to help transform intellectual capital into added value by contributing to Sustainable Development. She is also a member of the New Club of Paris, an international organisation whose main objective is to create awareness about the Knowledge Economy. As a Knowledge Management and Intellectual Capital expert, she works with several international organisations to promote the management of the intangibles as accelerators of Innovation, Competitiveness and Sustainability in the Digital Economy.



Prof Álvaro Rosa is associate professor (with Habilitation) at ISCTE Business School. Currently is the director of the Master of International Management at Iscte - Instituto Universitário de Lisboa and member of Scientific Committee of Iscte Doctoral Programme on Applied Management. His research interests are strategy, quality and cross-cultural management. He is a regular visiting scholar in faculties in China, Brazil, UK, and Slovenia.

Keynote Speaker



Luiz de Mello is Director of the Policy Studies Branch in the Economics Department of the OECD. Together with the policy studies teams, Mr. de Mello provides leadership and strategic direction within the economics department, ensuring the design and implementation of analysis and policies which promote stronger, cleaner, fairer and more inclusive economic growth for member and partner countries. Structural policy surveillance, short and long term economic outlooks, public finance and macroeconomic policy analysis are among the key workstreams for policy studies. Earlier in his career, Mr. de Mello held senior positions at the OECD, including Deputy-Director of the Public Governance Directorate and Chief of Staff and Counsellor to the Chief Economist. Prior to joining the OECD, he worked as a Senior Economist at the Fiscal Affairs Department of the International Monetary Fund, and as a Lecturer at the Economics Department of the University of Kent, United Kingdom. He holds a PhD in Economics from the University of Kent, United Kingdom.

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Jorge Betancur has been a researcher and professor of administration at the IUE, Faculty of Business Sciences, since 2007. His work has focused especially on the productive fabric of the region, especially SMEs, on the study and design of management models and on the transfer of knowledge from the University to companies.

Basia Dennis Bless is a qualified Monitoring and Evaluation practitioner with a special research interest in management of public institutions. In the last four years, he has been part of the European Conference on Research Methodology for Business and Management Studies and has recently submitted his thesis for the award of PhD in the field of Public Sector Monitoring and Evaluation at Wits School of Governance in South Africa.

Danielle Botha-Badenhorst holds a BEng in Computer Engineering from the University of Pretoria, South Africa (2021). She is pursuing an Engineering Honours in Innovation and Technology Management at the same university. Currently, she works as a cybersecurity specialist and researcher at the Council for Scientific and Industrial Research (CSIR) in Pretoria.

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Rebecca Burke is a Senior Lecturer in Project Management at Kingston University in London, UK. She spent 25 years delivering projects across a range of sectors before returning to academia in 2019 to PhD following her own experiences of pay inequity, and she hopes that her research will protect women in the future from the harm that it causes.

Margarida Casau holds an M.Sc. in Dentistry from the University of Coimbra and an M.Sc. in Economics from the University of Aveiro. She is currently a researcher and PhD student in the Doctorate in Business and Economics program at the University of Aveiro, where she is working on the field of Economics of Happiness.

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human rights issues. Gaining wide experience over the years enables that multidisciplinary approach. He is author of several books, conference papers, and journal papers.

Toni Eagar is a Senior Lecturer of Marketing at the Australian National University. Her research centres on the relationship between consumers, culture and the marketplace. Particularly, how social, critical, and literary theories can illuminate the relationships between market actors, branding and market structures focusing on Consumer Culture Theory.

Celal Erdogan is a PhD candidate in the Department of Business Administration at the ISMA University of Applied Sciences in Latvia. He is writing his PhD and works as a real estate valuer. His research focuses on the housing market, home price changes, affordability, gas station valuation, and hotel valuation.

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José Carlos Rodríguez graduated from Université du Québec à Montréal (UQÀM) in Canada. His research interests are in technology management and innovation, energy economics, and international business. He has published in several journals and conference proceedings on issues related to technology transfer and innovation systems. He is currently a Professor at the Economic and Business Research Institute (ININEE) in Mexico. He has been a Visiting Researcher at Gordon Institute of Business Science (GIBS) in South Africa and Institut National de la Recherche Scientifique (INRS) in Canada, and a Professor at Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM) and Centro de Investigación y Docencia Económicas (CIDE) in Mexico.

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Aloysius Sabog, I am Ghanaian by nationality. I am PhD student reading Economics and Management in Tomas Bata University in Zlin (Czech Republic) specialising in the field of Management. My research focus aligns directly to the theme of this conference, and it is for this reason I believe my participation in the upcoming conference would broaden my knowledge in this area.

Ruggero Sainaghi is Associate Professor at IULM University, Italy. He received his PhD in business administration and management from St. Gallen University, Switzerland. His research interests are destination management (strategic positioning, archetypes, corporate governance, performance measurement) and competitive strategies of tourism firms.

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Decentralized Decision Authority, Balanced Scorecard and Managerial Satisfaction: PLS-SEM Analysis

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Abstract: Organisations has recently experienced many operational difficulties hence the performance measurement systems (PMSs) have a great deal of importance in understanding organisational effectiveness in the wake of pandemic. Organisations use different types of PMSs according to their specific conditions. This situation is explained by contingency theory that the environmental and/or firm-specific factors cause organisations to use different types of PMSs. One of the organisational factors is the management's structure; particularly decentralised decision authority, is described as the delegation of decision rights throughout the organisation. In this type of an organisational structure, innovative PMS such as the balanced scorecard (BSC) is more effective to meet the information needs of organisations. Numerous studies investigated the relationship between the decentralised decision authority, different PMSs and organisational effectiveness. Nevertheless, researchers emphasise the need for a better understanding of factors influencing the use of innovative PMSs. Furthermore, previous studies only investigated organisational performance but, managerial satisfaction is another outcome of performance measurement implementation and given the received scant attention, it is needed to advance our understanding on this topic. Reviewed literature also indicates the need for more research on the firm's contingent factors, PMS, and managerial satisfaction relationship. In light of methodological developments in PLS-SEM domain, the current study answers this call by conducting research in the hotel industry. Hotel industry is a dynamic industry hence, decentralised decision authority enables to provide effective and timely decisions for arising conditions. Therefore, using the contingency theory, this study proposes and tests a research model which investigates the BSC as a mediator between decentralised decision authority and managerial satisfaction. Data was collected from hotel managers in Turkey and analysed using PLS-SEM. The findings demonstrate that decentralised decision authority has a positive effect on the BSC use which gives rise to increase managerial satisfaction. The results thus reveal that decentralised decision authority is related with the managerial satisfaction only through the BSC. This study makes a significant contribution to the largely neglected area in the hospitality performance measurement literature by investigating the aforementioned relationships. It also provides managerial practical implications of the findings.

Keywords: Decentralised Decision Authority, Balanced Scorecard, Performance Measurement System, Managerial Satisfaction

1. Introduction

Hotel organisations has experienced many operational difficulties which lead them to pay particular attention to their performance measurement systems (PMSs) in understanding organisational effectiveness in the wake of pandemic. At this point, it is worth mentioning that organisations adopt and use various types of PMSs as their context is different from each other. Related to this, contingency theory highlights that environmental and/or firm-specific factors are the main reason for an adoption and use of different types of PMSs by firms (Chenhall 2003; Otley 2016). Therefore, these factors should not be ignored by organisations as they impact on the design and use of an effective PMS. More importantly, organisational effectiveness depend on the fit between a PMS and these factors (Abdel-Kader & Luther 2008; King, Clarkson & Wallace 2010). There are various firm-specific or internal factors such as organisational culture, leadership etc. This study will focus on the decentralised decision authority in organisations as a type of management structure. It is described as the distribution of decision rights throughout the organisation (Arasli, Alphon & Arici 2019; Bangchokdee & Mia 2016). Hotel industry is a dynamic industry and is highly exposed to human interaction as it is people-oriented (Auzair & Langfield-Smith 2005; Sainaghi 2010; Sharma 2002). Therefore, a decentralised decision authority is believed to provide effective and timely decisions for arising situations which are critical for ensuring customer satisfaction (Arasli, Alphon & Arici 2019; Bangchokdee & Mia 2016; Sharma 2002). In such organisations, managers need more information which facilitates their planning, controlling, and decision-making (Widener,

Shackell & Demers 2008). The contemporary PMS such as the balanced scorecard (BSC) is more effective system to provide the information needs of these organisations which having a decentralised organisational structure. The BSC helps firms to collect information in relation to four aspects: financial, customer, internal business processes, and innovation and learning (Kaplan & Norton 1996, 2010). In the literature, numerous studies investigated the relationship between the organisations' management structure, PMSs and organisational effectiveness (Bangchokdee & Mia 2016; King, Clarkson & Wallace 2010; Uyar & Kuzey 2016). For instance, Uyar and Kuzey (2016) revealed that budgeting system mediates the association between decentralised structure and firm performance. However, these studies only investigated organisational performance as an outcome of implementing PMS but managerial satisfaction is another outcome of performance measurement implementation and given the received scant attention in the literature, it is needed to advance our understanding on this topic. Related to this, reviewed literature also indicates the necessity for more research on the firm's contingent factors, PMS, and managerial satisfaction relationship (Alphon, Sainaghi & Turker 2023; Sandt, Schäffer & Weber 2001). The current research thus answers this call by addressing how decentralised decision authority in hotel organisations create a need for the BSC use which in turn affects managerial satisfaction with the system. Specifically, considering the contingency theory, this study proposes and tests a research model in which the BSC plays as a full mediator role between the decentralised decision authority and the managerial satisfaction. Thus, this study makes a significant contribution to the largely neglected area in the hospitality performance measurement literature by investigating the aforementioned relationships with the consideration of Turkish hotel managers' perspective.

This paper is organised as follows. The next section explains the reviewed literature and develops the research hypotheses. Then, the research methodology outlines the method of collecting the data, sample, and measurements, which is followed by the empirical results. In the conclusion section, the findings are discussed, and the arguments emerging from our research are underlined, pointing out the similarities to the body of literature. In closing, a series of implications, limitations, and suggestions for future research are put forward.

2. Literature review and hypotheses development

This study draws from contingency theory to develop hypotheses as it provides the necessary theoretical approach for studies examine the factors that have relation with the use of PMSs and subsequent organisational results. (Abdel-Kader & Luther 2008; Chenhall 2003; Otley 2016).

2.1 Decentralised Decision Authority, the Balanced Scorecard and Managerial Satisfaction

All business industries have experienced many uncertainties and complexities, especially with the devastating impact of pandemic. Hence, continuous improvement of business operations has become very important as it helps organisations to identify value added activities in the operational processes which is critical for achievement of competitive advantage (Bititci et al, 2003; Haldma & Lääts 2002; Kaplan & Norton 1996). In service organisations, where customers are one of their primary stakeholders, adopting innovative approaches and having flexible operations have gained prominence in order to cope with current challenges. In this context, designing the suitable management structure is one of the issues must be taken into account by organisations. As a type of management structure, decentralised decision authority is described as the distribution of decision rights throughout the organisation (Bangchokdee & Mia 2016; Chenhall & Morris 1986; Moers 2006) and is one of the central variables in the contingency theory (Abernethy & Bouwens 2005; Gordon & Narayanan 1984). Related to this, studies stressed that in dynamic environments, this type of structure enables organisational managers to have quick decision-making for changing market conditions thus leads to higher performance (Andersen 2004; Uyar & Kuzey 2016).

In hotel organisations, departmental managers are usually closer to operational processes compared to top managers and they also have more contact with employees and customers (Arasli, Alphon & Arici 2019). With decision authority, middle managers can make decisions for their business units, have more flexibility and also faster communication among the other managers and staff. Thus, they can respond rapidly to the environment (e.g. customer requests, arising problems) which is critical for ensuring customer satisfaction. In addition, authorised hotel managers can have a positive sense of purpose toward their jobs, feel satisfied and are self-motivated for continuous improvement of their organisations so enhance business performance. For instance, Burgess (2013) indicated that decentralised structures in hotels let managers to operate in their own way which motivates them toward their job, enhance their efficiency and thus develop more innovation in operations.

In the wake of pandemic, issues such as customers' care, flexible and innovative business operations, and sustainable financial stability have become very crucial hence, create a need for hotel organisations to obtain these information. The function of PMSs is to collect the necessary information and enable managers to infer a result about organisational performance (Alphon, Sainaghi & Turker 2023). Nevertheless, it is worth noting that financial measures alone are not sufficient to provide such information (e.g., innovativeness) to organisations as these measures only provide the past indicators and do not focus on the long-term business planning (Bose & Thomas 2007; Kaplan & Norton 1996). In hotel organisations, departmental managers face complex situations and experience uncertainty in their decision making. Herein, the non-financial measures can be beneficial for these managers therefore, these measures are also involved in the hotel PMS for considering all aspects of the firm's value chain (Bangchokdee & Mia 2016). In this respect, an innovative BSC provides the results of past actions (financial) as well as the drivers of future performance (non-financial) in order to reveal value-added activities of organisations which improve competitiveness (Bose & Thomas 2007). In particular, this system, with its four aspects (financial, customer, internal business processes, innovation and learning) helps managers to unveil the level of organisational effectiveness (Kaplan & Norton 1996, 2010; Phillips & Louvieris 2005).

With respect to abovementioned explanations, several studies have investigated the role of decentralised decision authority on the different types of PMSs' use (Quesado, Guzman & Rodrigues 2014; Sharma 2002). While some studies found the association between decentralised decision authority and use of financial performance measures (Moers 2006; O'Connor, Deng & Luo 2006); others showed opposite results (Indjejikian & Matejka 2012). The argument for the latter is in decentralised structural organisations, managers more likely depend on non-financial and process type of measurements and therefore, they more utilise from innovative PMS (Abernethy & Bouwens 2005). Nonetheless, with few exceptions in the hospitality context (Arasli, Alphon & Arici 2019; Bangchokdee & Mia 2016), there is a need for further research on this topic based on a contingency approach. Hence, we propose that;

Hypothesis 1: Decentralised decision authority has a positive influence on the BSC use in hotels.

Recent ambiguous and complex issues has caused organisations to give more attention to the outcomes of PMSs such as performance results (Decoene & Bruggeman 2006), employees' affective reactions (Molina, González, Florencio & González 2014), reward practices (Franco-Santos, Bourne & Huntington 2004). Decoene and Bruggeman (2006) for example reported that in the BSC design and implementation process, strategic alignment between the corporate-level goals and operational-level goals results in better organisational performance. In addition, Rampersad (2008) introduced the personal BSC as involving personal - level mission, vision, objectives and performance measures which the organisations use to engage employees and thus, achieving high-performance.

Similarly, in today's competitive hotel industry, innovative PMSs should be tailored to enhance positive organisational outcomes. Related to this, studies showed that if hotel managers make use of only financial performance measures to improve short-term profitability, can affect negatively other performance areas (e.g., service quality) and ultimately have an adverse impact on firm's future performance (Bangchokdee & Mia 2016; Phillips & Louvieris 2005). Other researches similarly found a positive relationship between innovative PMS and organisational performance (Arasli, Alphon & Arici 2019). However, these studies only investigated organisational performance as an outcome of implementing PMS whereas managerial satisfaction which is another outcome, largely neglected in the hospitality performance measurement literature, with a recent exception (Alphon, Sainaghi & Turker 2023). Therefore, it is hypothesised that;

Hypothesis 2: The BSC use has a positive influence on the managerial satisfaction in hotels.

In addition, studies reported a positive relationship between decentralised decision authority, PMSs and organisational performance (Bangchokdee & Mia 2016; Uyar & Kuzey 2016). Similarly, a research in financial services sector found that budgetary participation of managers lead to improved company performance and job satisfaction. (Chong, Eggleton & Leong 2005). Moreover, an involvement of middle management positively impacts firm performance through organisational capabilities (Ouakouak, Ouedraogo & Mbengue 2014) such as an implementation of modern PMS.

Previously, it was argued that decision authority lead managers to have better work motivation, etc. At this point, unlike the other PMSs, the BSC can measure these aspects (e.g. staff satisfaction). Besides, hotels provide services through their various departments which require different skills. So, if the BSC functions effectively and provide necessary information about the business, then managers become satisfied. Regarding this, reviewed literature indicates a critical gap with regards to the association between the organisation's contingent factors,

PMS and managerial satisfaction. Drury and Tayles (2005) stressed that managers' dissatisfaction with the costing system is attributed to the lack of 'fit' between the contextual factors and the costing system and recommended its determination. Other studies also stressed that this issue should be elucidated (Alphon, Sainaghi & Turker 2023; Sandt, Schäffer & Weber 2001). Hence, we formulate below hypothesis;

Hypothesis 3: The BSC use fully mediates the effect of decentralised decision authority on the managerial satisfaction in hotels.

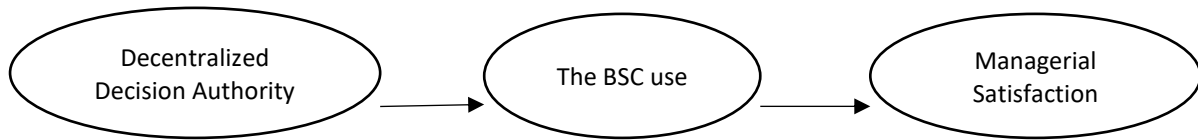


Figure 1: Research model.

3. Research Methodology

3.1 Procedure and Sample

This study was done with four and five star hotel managers in Turkey. Turkey is one of the most popular tourism destinations and the hotel industry has a great contribution in Turkey's economic prosperity. Before starting to collect the data, we did pilot study to ensure the clarity of research questions and then we sent online survey to the managers. One hundred forty five valid responses was obtained from the data collection. The demographic profile of the respondents is summarised as follows: among the hotel managers, 84.1% were male and 15.9% were female; the majority of participants were aged between 38 and 57 years (69.7%); 69% held a bachelor's and postgraduate degree; approximately 14% had a junior college degree; 17.3% had a high-school diploma or below; 65.5% of respondents had a tenure of five years or less at their current hotel companies.

3.2 Measures

In this study, Gordon and Narayanan (1984)'s scale was used to measure decentralised decision authority with a six-item scale. The BSC scale was adopted by Elbanna, Eid and Kamel (2015) and measured with thirty three items. Lastly, managerial satisfaction scale was adopted by Ittner, Larcker and Randall (2003) and measured with three items. All variables were validated and used in the previous studies.

4. Results

This study used the Partial Least Squares Structural Equation Modeling (PLS-SEM) for analysing the data which has become advanced method in business management research. The disjoint two-stage approach was followed so, while the decentralised decision authority and managerial satisfaction were included as reflective constructs, the BSC was included as a second-order reflective-formative construct. Using a two-stage approach, the second-order construct was established for assessing the measurement model of the initial framework (Ali et al, 2018). In the first stage, reliability and the convergent validity of the measurement model which includes reflective first-order constructs were evaluated by examining the outer loadings of the constructs' items, Cronbach's alpha, composite reliability (CR), Rho-A, and average variance extracted (AVE) (Ali et al, 2018). The outer loadings, Cronbach's alpha, CR, and rho-A of the constructs should exceed 0.7 for establishing reliability and AVE values should be higher than 0.5 for establishing convergent validity (Ali et al, 2018). Nevertheless, if CR and AVE meet the threshold, loadings between 0.5 and 0.7 are still acceptable (Hair et al, 2017). Table 1 indicates that the reliability and convergent validity are established for the study's model.

Table 1: Results: Measurement model assessment for first-order constructs

Construct's items	Outer loadings	Cronbach's alpha	CR	Rho-A	AVE
Decentralised Decision Authority		0.806	0.865	0.825	0.563
DDA1					
DDA2	0.716				
DDA3	0.667				
DDA4	0.835				
DDA5	0.800				
	0.722				

Construct's items	Outer loadings	Cronbach's alpha	CR	Rho-A	AVE
BSC-Finance Dimension		0.923	0.936	0.933	0.621
FINA1	0.740				
FINA2	0.763				
FINA3	0.821				
FINA4	0.815				
FINA5	0.806				
FINA6	0.664				
FINA7	0.865				
FINA8	0.818				
FINA9	0.785				
BSC-Customer Dimension		0.900	0.919	0.902	0.558
CUST1	0.844				
CUST2	0.758				
CUST3	0.800				
CUST4	0.679				
CUST5	0.771				
CUST6	0.710				
CUST7	0.789				
CUST8	0.696				
CUST9	0.652				
BSC- Internal Business Process Dimension		0.786	0.864	0.786	0.617
IBP1	0.823				
IBP2	0.865				
IBP3	0.813				
IBP6	0.619				
BSC- Innovation & Learning Dimension		0.882	0.909	0.889	0.589
IL1	0.754				
IL2	0.785				
IL3	0.741				
IL6	0.655				
IL7	0.855				
IL8	0.849				
IL9	0.712				
Managerial Satisfaction		0.935	0.958	0.937	0.885
SAT1	0.920				
SAT2	0.961				
SAT3	0.941				

The Fornell–Larcker criterion and heterotrait–monotrait (HTMT) approaches were used to evaluate the discriminant validity. Herein, the square root of the AVE value for each construct must be greater than its correlation with other constructs to establish discriminant validity (Fornell & Larcker 1981). According to the HTMT approach, the value of all constructs should be less than 0.9 (Henseler et al, 2015). In Tables 2 and 3, the results display that the discriminant validity is established.

Table 2: Discriminant Validity; Fornell - Larcker

	1	2	3	4	5	6
1. IBP dimension of BSC	0.786					
2. Customer dimension of BSC	0.754	0.747				
3. Financial dimension of BSC	0.414	0.574	0.788			
4. Managerial Satisfaction	0.484	0.562	0.376	0.941		
5. Decentralised Decision Authority	0.456	0.419	0.306	0.360	0.750	
6. I&L dimension of BSC	0.726	0.705	0.406	0.501	0.511	0.768

Abbreviations: BSC, balanced scorecard; IBP, internal business process; I&L, innovation and learning.

Table 3. Discriminant Validity; HTMT

	1	2	3	4	5	6
1. IBP dimension of BSC						
2. Customer dimension of BSC	0.895					
3. Financial dimension of BSC	0.477	0.639				
4. Managerial Satisfaction	0.563	0.605	0.392			
5. Decentralised Decision Authority	0.573	0.485	0.330	0.419		
6. I&L dimension of BSC	0.876	0.785	0.440	0.545	0.598	

Abbreviations: BSC, balanced scorecard; IBP, internal business process; I&L, innovation and learning.

In the second stage, the BSC as second-order formative construct was established by using the score of its related four dimensions from the first stage. In this stage, there is one second-order formative and two reflective constructs in the model. To evaluate the formative construct, multicollinearity test was done. The values of variance inflation factor (VIF) should be less than 5 (Ali et al, 2018). The VIF values for the BSC's four perspectives were between 1.495 and 3.175 thus, it is provided that multicollinearity was not an issue for the study model.

After the measurement model is validated, the structural model is evaluated. The coefficient of determination (R^2) explains the amount of variance in the model. The R^2 value for managerial satisfaction was 0.352 showing that the condition of this variable is satisfactory. The results of the hypothesised relationships were presented in Table 4. A bootstrapping procedure was performed to evaluate the significance of the path coefficients (Chin 1998). According to our results, all the hypotheses are supported.

Table 4: Hypotheses Results

	Path Coefficient	P Value	t Value	Confidence interval (bias corrected)	Supported
H1. Decentralised decision authority → BSC	0.521	<0.01	9.780	[0.385, 0.588]	Yes
H2. BSC → Managerial satisfaction	0.565	<0.01	8.538	[0.430, 0.654]	Yes
H3. Decentralised decision authority → BSC → Managerial satisfaction	0.294	<0.01	5.882	[0.199, 0.359]	Yes

Abbreviations: BSC, balanced scorecard.

5. Conclusion

This study examined whether the BSC fully mediates the association between decentralised decision authority and managerial satisfaction with the system in the hotel industry. Data collected from hotel managers in Turkey indicated that our arguments pointing out the similarities to the body of literature.

Considering contingency theory as a theoretical basis for the current research (Chenhall 2003; Otley 2016), the results suggest that decentralised decision authority in hotels creates a need for an innovative PMS. In line with the study of Arasli, Alphon and Arici (2019), our findings demonstrated that the BSC helps managers to understand how effective to have such a managerial structure. Furthermore, the outcomes also confirmed that the BSC use results in managerial satisfaction. Thus, as the results suggest, the BSC has the full mediating mechanism between decentralised decision authority and managerial satisfaction.

The hotel industry is very dynamic industry and the operating environment is quickly changing. Especially, the pandemic has caused many new requirements for hotel organisations such as providing training for safe employee-guest encounters, focusing occupational safety and paying extra attention for clean services. These requirements and/or any arising needs or problems can be timely pinpointed by departmental managers who are usually involved in operational processes and closer to organisational people and guests. Therefore, it is important to design organisational structure in which the departmental managers are given the decision making authority for timely actions. At that point, the BSC helps decision making of these managers. For instance, internal business process dimension of the BSC provides information such as daily routine operations and thus it can detect and indicates the room for improvement in this dimension. Customer feedbacks and satisfaction measures are injected into the customer dimension of the BSC and according to the results obtained, managers can develop new approaches to improve customer service. In this way, the BSC overcomes deficiencies of traditional PMSs and helps hotels to measure the organisational effectiveness from different perspectives (Phillips & Louvieris 2005). As a result, providing a decentralised decision authority as a part of hotel organisation's management culture and using an innovative BSC can create managerial satisfaction.

The current research provides recommendations for hotel managers concerning the design of management structure, the BSC use and attainment of positive organisational results. First of all, in today's dynamic and volatile hotel environment, it is critical for managers to have decision authority in order to be able to continue flexible and efficient hotel services. Related to PMS, managers' priority should not only focused on the financial and/or the guests related matters. It is usually observable that organisations mainly concern with profitability, costing etc. and disregard the other points especially during the crisis and uncertain times. For example, cutting staff training costs during the period of economic downturn can help to increase profit, but will negatively affect the staff's ability to improve work performance in the future. The BSC with its various financial and non-financial

performance measures support the organisational strategy and long-term planning which in turn lead to managerial satisfaction.

Last but not least, although this research has faced certain limitations, the outcomes could be a fruitful input for future studies. Firstly, the study is limited to hotel organisations only therefore generalising our results to other industrial organisations should be made with caution. Furthermore, we only involved four and five star hotels. So that, future studies could test this study's model by taking into account the different types of hotels (e.g., family owned vs non-family owned hotels). Another shortcoming is the results related to BSC use and managerial satisfaction because these results represent managers' perceptual opinions which might raise questions about validity. Hence, future studies can consider to use other methodological designs to extend our findings. Lastly, future researches can involve the other contingent factors and examine how the fit between these factors and company's PMS impacts the managerial satisfaction.

References

- Abdel-Kader, M. and Luther, R., 2008. The impact of firm characteristics on management accounting practices: A UK-based empirical analysis. *The British Accounting Review*, Vol 40, No. 1, pp 2-27.
- Abernethy, M. A. and Bouwens, J., 2005. Determinants of accounting innovation implementation. *Abacus*, Vol 41, No. 3, pp 217-240.
- Ali, F., Rasoolimanesh, S. M., Sarstedt, M., Ringle, C. M. and Ryu, K., 2018. An assessment of the use of partial least squares structural equation modeling (PLS-SEM) in hospitality research. *International Journal of Contemporary Hospitality Management*, Vol 30, No. 1, pp 514-538.
- Alphon, C., Sainaghi, R. and Turker, N., 2023. Market Competition, Balanced Scorecard, and Their Effects on Hotel Organisational Performance and Manager's Satisfaction. *International Journal of Hospitality & Tourism Administration*, pp 1-24.
- Andersen, T. J., 2004. Integrating decentralized strategy making and strategic planning processes in dynamic environments. *Journal of management studies*, Vol 41, No. 8, pp 1271-1299.
- Ángel Calderón Molina, M., Manuel Hurtado González, J., Palacios Florencio, B., & Luis Galán González, J., 2014. Does the balanced scorecard adoption enhance the levels of organizational climate, employees' commitment, job satisfaction and job dedication?. *Management Decision*, 52(5), 983-1010.
- Arasli, H., Alphon, C. and Arici, H. E., 2019. Can balanced scorecard adoption mediate the impacts of environmental uncertainty on hotel performance? The moderating role of organizational decision-making structure. *Journal of Hospitality Marketing & Management*, Vol 28, No. 8, pp 981-1009.
- Auzair, S. M. and Langfield-Smith, K., 2005. The effect of service process type, business strategy and life cycle stage on bureaucratic MCS in service organizations. *Management Accounting Research*, Vol 16, No. 4, pp 399-421.
- Bangchokdee, S. and Mia, L., 2016. The role of senior managers' use of performance measures in the relationship between decentralization and organizational performance: Evidence from hotels in Thailand. *Journal of Accounting & Organizational Change*, Vol 12, No.2, pp 129-151.
- Bititci, U. S., Martinez, V., Albores, P. and Mendibil, K., 2003. Creating and sustaining competitive advantage in collaborative systems: the what and the how. *Production Planning & Control*, Vol 14, No. 5, pp 410-425.
- Bose, S. and Thomas, K., 2007. Applying the balanced scorecard for better performance of intellectual capital. *Journal of intellectual capital*, Vol 8, No.4, pp 653-665.
- Burgess, C., 2013. Factors influencing middle managers' ability to contribute to corporate entrepreneurship. *International Journal of Hospitality Management*, Vol 32, pp 193-201.
- Chenhall, R. H. and Morris, D., 1986. The impact of structure, environment, and interdependence on the perceived usefulness of management accounting systems. *Accounting Review*, Vol 61, No. 1, pp 16-35.
- Chenhall, R.H., 2003. Management control systems design within its organizational context: findings from contingency-based research and directions for the future. *Accounting, organizations and society*, Vol 28, No. 2-3, pp 127-168.
- Chin, W. W., 1998. The partial least squares approach to structural equation modelling. *Modern methods for business research*, Vol 295, No. 2, pp 295-336.
- Chong, V. K., Eggleton, I. R. and Leong, M. K., 2005. The impact of market competition and budgetary participation on performance and job satisfaction: a research note. *The British Accounting Review*, Vol 37, No. 1, pp 115-133.
- Decoene, V., & Bruggeman, W., 2006. Strategic alignment and middle-level managers' motivation in a balanced scorecard setting. *International Journal of Operations & Production Management*, 26(4), 429-448.
- Drury, C., & Tayles, M., 2005. Explicating the design of overhead absorption procedures in UK organizations. *The British Accounting Review*, 37(1), 47-84.
- Elbanna, S., Eid, R. and Kamel, H., 2015. Measuring hotel performance using the balanced scorecard: A theoretical construct development and its empirical validation. *International Journal of Hospitality Management*, Vol 51, pp 105-114.
- Fornell, C. and Larcker, D. F., 1981. Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, Vol 18, No. 1, pp 39-50.

- Franco-Santos, M., Bourne, M., & Huntington, R., 2004. Executive pay and performance measurement practices in the UK. *Measuring Business Excellence*, 8(3), 5-11.
- Gordon, L. A. and Narayanan, V. K., 1984. Management accounting systems, perceived environmental uncertainty and organization structure: An empirical investigation. *Accounting, Organizations and Society*, Vol 9, No. 1, pp 33-47.
- Hair, J. F., Jr, Hult, G. T. M., Ringle, C. and Sarstedt, M., 2017. *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.), Sage.
- Haldma, T. and Lääts, K., 2002. Contingencies influencing the management accounting practices of Estonian manufacturing companies. *Management accounting research*, Vol 13, No. 4, pp 379-400.
- Henseler, J., Ringle, C. M. and Sarstedt, M., 2015. A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, Vol 43, No.1, pp 115-135.
- Indjejikian, R. J. and Matějka, M., 2012. Accounting decentralization and performance evaluation of business unit managers. *The Accounting Review*, Vol 87, No. 1, pp 261-290.
- Ittner, C. D., Larcker, D. F. and Randall, T., 2003. Performance implications of strategic performance measurement in financial services firms. *Accounting, Organizations and Society*, Vol 28, No. 7-8, pp 715-741.
- Kaplan, R. S. and Norton, D. P., 1996. Linking the balanced scorecard to strategy. *California management review*, Vol 39, No.1, pp 53-79.
- Kaplan, R. S. and Norton, D. P., 2010. *The balanced scorecard: measures that drive performance*. Harvard Business Review Press.
- King, R., Clarkson, P.M. and Wallace, S., 2010. Budgeting practices and performance in small healthcare businesses. *Management Accounting Research*, Vol 21, No. 1, pp 40-55.
- Moers, F., 2006. Performance measure properties and delegation. *The Accounting Review*, Vol 81, No. 4, pp 897-924.
- O'Connor, N. G., Deng, J. and Luo, Y., 2006. Political constraints, organization design and performance measurement in China's state-owned enterprises. *Accounting, Organizations and Society*, Vol 31, No.2, pp 157-177.
- Otley, D., 2016. The contingency theory of management accounting and control: 1980-2014. *Management accounting research*, Vol 31, pp 45-62.
- Ouakouak, M. L., Ouedraogo, N. and Mbengue, A., 2014. The mediating role of organizational capabilities in the relationship between middle managers' involvement and firm performance: A European study. *European Management Journal*, Vol 32, No. 2, pp 305-318.
- Phillips, P. and Louvieris, P., 2005. Performance measurement systems in tourism, hospitality, and leisure small medium-sized enterprises: a balanced scorecard perspective. *Journal of Travel Research*, Vol 44, No. 2, pp 201-211.
- Quesado, P. R., Guzman, B. A. and Rodrigues, L. L., 2014. Determinant Factors of the Implementation of the Balanced Scorecard in Portugal: empirical evidence in public and private organizations. *Revista Brasileira de Gestão de Negócios*, Vol 16, pp 199-222.
- Rampersad, H. K., 2008. The way to a highly engaged and happy workforce based on the Personal Balanced Scorecard. *Total Quality Management*, 19(1-2), 11-27.
- Sainaghi, R., 2010. Hotel performance: state of the art. *International Journal of Contemporary Hospitality Management*, 22(7), 920-952.
- Sandt, J., Schäffer, U. and Weber, J., 2001. *Balanced performance measurement systems and manager satisfaction: empirical evidence from a German study* (p. 170). Vallendar: WHU, Lehrstuhl für Betriebswirtschaftslehre, insbesondere Controlling und Telekommunikation.
- Sharma, D. S., 2002. The differential effect of environmental dimensionality, size, and structure on budget system characteristics in hotels. *Management Accounting Research*, Vol 13, No. 1, pp 101-130.
- Uyar, A. and Kuzey, C., 2016. Contingent factors, extent of budget use and performance: A structural equation approach. *Australian Accounting Review*, Vol 26, No.1, pp 91-106.
- Widener, S. K., Shackell, M. B., & Demers, E. A., 2008. The juxtaposition of social surveillance controls with traditional organizational design components. *Contemporary Accounting Research*, 25(2), 605-638.

Semi- Structured Interview of Industry 4.0 for the SMEs in the Malaysian Construction Industry

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Abstract: Industry 4.0 (IR 4.0) is becoming a trend in various sectors despite being originated from the manufacturing industry. This concept has even grasped the attention of the construction sector due to its various benefits such as increased in product quality, productivity, and cost savings. In order to adopt this concept for the construction industry, focuses should be placed upon the small and medium-sized enterprises (SMEs) since they play a major part in influencing the economy. This paper aims to examine the challenges, enablers of IR 4.0, investigate the readiness and identify the ways to improve the implementation of IR 4.0 for the SMEs in the Malaysian construction industry. This study employed a semi-structured interview amongst twenty (20) industrial construction players around the Klang Valley. The collected data was then analysed and the results showed that they agreed that the main challenges in adopting IR 4.0 concept for the construction SMEs were lack of financial resources, ineffective process change strategy and low experiences in utilizing skilled applications and technologies. The interviewees believed that the important enablers for IR 4.0 in the construction industry were Building Information Modelling (BIM), cloud technology, and Industrialised Building System (IBS). BIM is also becoming a growing trend in the construction industry. The interviewees mentioned that the current readiness of the IR 4.0 concept for the construction SMEs is still below par yet there is still potential to be improved especially in terms of the organisations management, awareness, and implementation level. Government and its agencies need to play the biggest roles as the driving force in ensuring advanced technologies are successfully implemented in the construction industry. The results from this research will be used to produce a robust framework to hasten the adoption of IR 4.0 for the construction industry SMEs.

Keywords: Construction industry, construction SMEs, Industry 4.0, IR 4.0

1. Introduction

The concept of Industry 4.0 (IR 4.0) is becoming a huge booming trend in several industries nowadays. This concept originated from Germany in which its sole purpose was to enhance its countries economic performance through the digitization of their manufacturing sector (Roblek et al., 2016; Vogel-Heuser & Hess, 2016). According to Kolberg et al. (2016), IR 4.0 is defined as “The vision of smart components and machines which are integrated into a common digital network based on the well-proven internet standards”. It can also be considered as the emergent of cyber-physical systems (CPS) involving entirely new capabilities between people and machines (Davis, 2016).

In Malaysia, a national policy known as ‘The National 4IR Policy’ was created as a proof of the government’s commitment towards realising the digital revolution. The aim of it is to transform the socioeconomic development of the country through ethical use of IR 4.0 technologies. It helps in providing the principles and strategic direction in formulating the policies and action plans that can optimise resource allocation and implement ideal coordination in matters related to emerging technologies (Economic Planning Unit (EPU), 2021).

Various industries have demonstrated drastic development through the ongoing introduction of innovative technologies yet despite that, the construction industry is still very hesitant in incorporating it to their common practices (Alaloul et al., 2020). A survey that was conducted by Roland Berger back in 2016, determined that about 93% of construction stakeholders are on the same page that working processes in construction can be greatly affected by the concept of digitization yet only a small number of construction firms are maximizing the full potential of digital planning tools which raises a concern for the construction industry in the pathway of achieving digital transformation in the future.

The Malaysian construction industry has continued to play a significant role in the economic growth of the country, as well as facilitating the development of socioeconomics of the society at large. The need for a high-quality physical infrastructure and wide access to affordable housing has fostered the adoption of new technologies and new construction methods (Construction Industry Development Board (CIDB), 2021). The positive outlook towards the state-of-the-art technological adoption in the construction industry highlights the need for an ideal framework on how to properly introduce it into the sector.

Around the world, small and medium sized enterprises (SMEs) is considered as one of the most significant forces for the development of a country’s economy. SMEs are acknowledged as the vital factor to stimulate innovation, increasing the economic growth, job opportunities and reducing poverty (Rotar et al., 2019). According to the

CIDB, in the Malaysian construction industry, more than 90% of registered construction companies are SMEs (CIDB, 2011). Thus, much focus should be placed first upon the SMEs in regards to formulating the framework for the IR 4.0 adoption for the construction industry.

The objectives of this research were to determine the challenges faced by SMEs in adopting IR 4.0 in the Malaysian construction industry, propose the enablers of IR 4.0 for the Malaysian construction industry, investigate the readiness of SMEs in the Malaysian construction industry, and identify the methods to successfully implement IR 4.0 for the construction SMEs.

2. Industry 4.0 in the construction industry

A country's economic performance is greatly influence through the contribution of several sectors such as the construction industry. A report that was made by the World Economic Forum & The Boston Consulting Group (2018) highlighted that the world gross domestic product (GDP) for the construction industry currently stands at around 6% and is expected to increase up to 14.7% by the year 2030 (Global Construction Perspectives & Oxford Economics, 2015). The construction industry in the European Union (EU) is responsible in providing around 18 million jobs to the people with the help from various stakeholders and companies and is considered as an important sector for the economy (European Commission, 2016). In the report posted by the Department of Statistics Malaysia (DOSM), the value of construction work done in the third quarter of 2019 contracted around 0.6% year-on-year basis, generating up to RM36.1 billion as compared to the second quarter which amounted up to RM35.9 billion (Department of Statistics Malaysia (DOSM), 2019).

Despite the economic success, the perception of the construction industry is still quite conservative, highly reliant on low technology, having poor quality image and low performance (Al-Qutaifi et al., 2018). The big reason on why it is challenging for the industry to adapt new technologies is due to the unique and complex nature of the construction sector itself. Construction companies hesitated to adopt new technologies because of the investments and uncertainty concerning the resulting benefits that lies behind it (Davies et al., 2014).

Most of the construction industry companies are made up of SMEs and because of this, it hinders their capabilities to invest in advanced technologies. To overcome this issue, most SMEs will have to rely on the assistance from governing bodies and authorities through partnership and funding programs to help with the IR 4.0 implementation (Alaloul et al., 2020).

3. Malaysian construction industry smes

SMEs are an efficient engine of growth since they contributed a lot towards job opportunities and economic development (Arthur-Aidoo et al., 2015). The definition of SMEs can be categorized through various aspects such as capital assets, labour skills, turnover level, method of production and legal status. Several literatures regarding SMEs usually defines them based on two characteristics which are the number of employees and or the firm's fixed assets which is in line with their function. A good thing to take note as well is that there is no accepted standard definition of SMEs and they are highly dependent upon the industries and countries (Matt & Rauch, 2020).

In Malaysia, construction SMEs can be defined as an enterprise that has a tendering capacity less than RM 5 million and a paid-up capital which is less than RM 250,000 according to Construction Industry Development Board (CIDB) (Kamal & Flanagan, 2014). The paid up capital and tendering capacity are used by CIDB in categorizing the grade of contractors from G1 until G7. Therefore, it can be said that for SMEs, it can be graded from G1 until G5 grade of contractors.

4. Methodology

A semi-structured interview was conducted for this research in order to complement the findings obtained from an earlier questionnaire survey involving a similar topic (Bin Tayib et al., 2022). Upon completion of the survey, a decision was made as to the most appropriate approach for conducting the interviews for this research. The interview questions were properly designed and were put through a pre-test process to ensure that they were suitable for gathering as much valuable data as possible on the subject being studied. The literature review and the findings from the survey, on which the questions for the interviews will be based upon were meant to provide more in-depth understanding, insight, and information before proceeding further into the next step of the framework development.

The data collected from this semi-structured interview was then transcribed for further analysis and interpretation. The information gathered from the semi-structured interviews formed the basis for the next step of the research later, which is the Modified Delphi survey. Figure 1 outlines the execution of the interview process in this research.

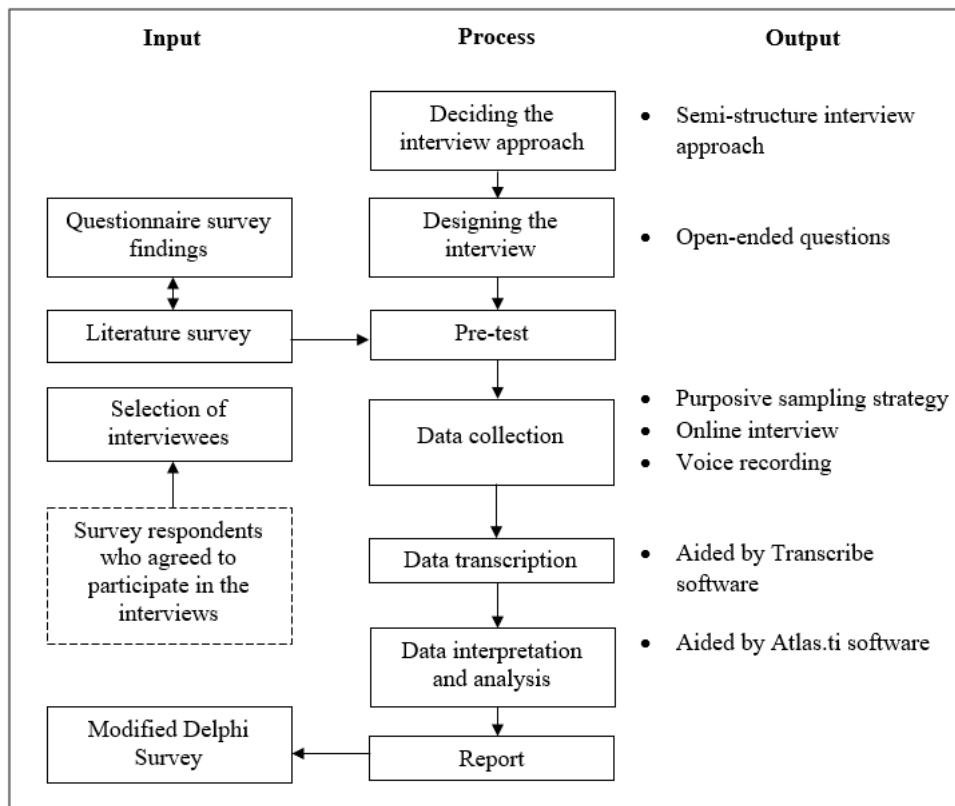


Figure 1: Interview Execution Process

The built up of the questions for this semi-structured interview was based on an earlier study (Bin Tayib et al., 2022) which was distributed amongst 150 construction SMEs around the Klang Valley regarding the implementation of IR 4.0 for the SMEs in the construction sector. Table 1 displayed the questions that will be used during the semi-structured interview.

Table 1: Interview Questions

Themes	Questions
Challenges faced by SMEs in the Malaysian construction industry in adopting IR 4.0.	<ol style="list-style-type: none"> 1) Do you agree on the list of five (5) top challenges faces by construction SMEs in adopting IR 4.0 as obtained from the questionnaire survey? Please elaborate in detail each of those challenges. 2) Based on your experience of being in the construction industry, what do you think are the other challenges that could slow down the adoption of IR 4.0 in the industry?
Enablers of IR 4.0 in the Malaysian construction industry.	<ol style="list-style-type: none"> 1) Do you agree on the list of five (5) common enablers of IR 4.0 in the Malaysian construction industry as obtained from the questionnaire survey? Please elaborate in detail each of the enablers. 2) Based on your experience of being in the construction industry, what do you think are the other enablers of IR 4.0 in the industry?
Readiness of SMEs in the Malaysian construction industry in adopting IR 4.0.	<ol style="list-style-type: none"> 1) Do you agree on the list of five (5) top readiness of construction SMEs in adopting IR 4.0 in the Malaysian construction industry as obtained from the questionnaire survey? Please elaborate in detail each of the factors.
Ways in improving the implementation of IR 4.0 for the SMEs in Malaysian construction industry.	<ol style="list-style-type: none"> 1) What would be the important elements that can improve the success of implementing IR 4.0 for the construction SMEs?

Purposive sampling strategy was employed to select the participants for the semi-structured interview. As the name implies, purposive sampling is 'confined to specific types of people who can provide the desired information, either because they are the only ones who have it, or conform to some criteria set by the researcher (Sekaran & Bougie, 2009). As such, since this research is about the nature of IR 4.0, the ideal persons to provide information are those who have confronts, possessed a general idea around IR 4.0 in construction or utilize technological development concept in their businesses. The participants will be the consultants and G1 until G5 contractors which were deemed as the SMEs for construction.

Prior to the execution of the interview, the potential participants, i.e., the questionnaire survey respondents who demonstrated their willingness to participate, were contacted through email and phone to set the date and location for the interview. A letter of invitation was sent to the potential participants to choose the date, time and place deemed appropriate for the interview. To eliminate the problem of low participation, the interview question sheet was provided only upon request. However, the cover letter contained a detailed explanation of the interview, including the objectives and topic to be discussed, to allow the participants to be prepared.

Also, the participants were selected based on their current designations, relevant experience, and availability during the scheduled interview period. As obtaining in-depth information and time constraints were the main concerns in this research, the interview was limited to only experienced practitioners with a minimum of ten (10) years in the construction industry and experience in dealing with IR 4.0. In total, twenty (20) out of the forty-one (41) respondents confirmed their participation. The details of the interviewees' profiles are illustrated in Table 2

Table 2: Interviewee Profiles

	ID	Designation	Years of experiences
1.	A1	Engineer	18
2.	A2	Engineer	17
3.	A3	Quantity Surveyor	10
4.	A4	Architect	22
5.	A5	Quantity Surveyor	25
6.	A6	Engineer	18
7.	A7	Project Manager	12
8.	A8	Engineer	22
9.	A9	Engineer	25
10.	A10	Architect	29
11.	A11	Engineer	30
12.	A12	Project Manager	28
13.	A13	Engineer	27
14.	A14	Architect	23
15.	A15	Architect	22
16.	A16	Engineer	22
17.	A17	Quantity Surveyor	26
18.	A18	Architect	22
19.	A19	Project Manager	30
20.	A20	Architect	26

As depicted in Tables 2, the 20 interviewees were spread evenly across the two groups of industry participants, consultants and the G1 until G5 contractors. In terms of experience in the industry, all the interviewees had been in the industry for more than ten (10) years. The practical experience of the interviewees suggest that the information, ideas, and insight provided by them were highly valuable for this research.

5. Result and analysis

Twenty (20) interviews lasting between 45-90 minutes per session were conducted. Hagaman & Wutich (2016) asserted that there are no pre-set rules on the number of interviews but numbers ranging from twenty (20) to forty (40) is needed to reach data saturation. The first section of the interview question was designed to ask interviewees about the challenges faced by the construction SMEs in the Malaysian construction industry in adopting IR 4.0. The purpose of this question was to further investigate the industry practitioner’s opinion in the issues that may be found when trying to implement IR 4.0. The interviewees were informed of the survey results that listed the following as the top five (5) challenges faces by construction SMEs; (1) shortage of financial resources; (2) absence of an ideal process change strategy; (3) not used to utilizing highly skilled applications and technologies; (4) concerns of cyber security, the crimes of hacking and risk assessment, and (5) lack of a skilled workforce. All the interviewees agreed with these five challenges and were then subsequently asked to elaborate on these issues based on their working experiences. They were also asked on what other challenges that they think that could be faced by SMEs in adopting IR 4.0.

The second part of the interview question was designed to ask interviewees about the enablers of IR 4.0 for the SMEs in the Malaysian construction environment. The purpose of this question was to further investigate the industry practitioner’s opinion in the technologies that may be found when trying to implement IR 4.0. The interviewees were informed of the survey results that listed the following as the five (5) common enablers of IR 4.0 by the construction SMEs; (1) Building Information Modelling (BIM); (2) modularization/prefabrication; (3) Augmented/Virtual/Mixed Reality (AR/VR/MR); (4) Cyber-Physical systems (CPS) and (5) Cloud Computing. The interviewees generally agreed with these five enablers and were also asked on what are the other enablers in regards to IR 4.0 in the construction industry.

The third part of the interview question was created to ask interviewees about the readiness of the SMEs in adopting IR 4.0 in the Malaysian construction industry environment. The earlier survey results listed the following as the top five (5) important criteria of the readiness of the construction SMEs in the Malaysian construction industry; (1) modelling and simulation such as AutoCAD and BIM; (2) accessibility to internet; (3) modularization or prefabrication; (4) skill development and (5) openness of employees in learning new technology.

And the final part of the interview question was designed to ask interviewees about the important elements that can improve the success of implementing IR 4.0 and the ways to improve the implementation of IR 4.0 for the SMEs in the Malaysian construction industry. It listed the following as the top five methods (5); (1) regulatory framework and adoption of IR 4.0 in the company; (2) provide roadmaps for the IR 4.0 adoption; (3) enhancement of workforce’s knowledge and re-skill, up-skill training; (4) formulate a national policy of IR 4.0 that focuses on the construction industry; (5) have a clear written change strategy. The data from the semi-structured interview questions were transcribed using Transcribe software and analysed using the Atlas.ti software. The analysed data was highlighted and tabulated in Table 3 below.

Table 3: Interview Results

Interviewees	Comments
A1	<ul style="list-style-type: none"> “Situation would become more complex when the adoption of technology such as IBS in the construction business requires high capital intensive. Due to this, small contractors who has no existing financial backup are not able to set up their own manufacturing plants as it involves very high capital investment.”
A2	<ul style="list-style-type: none"> “The traditional methods of doing things in construction are slowly, slowly becoming obsolete because there is simply a technology becoming cheaper and cheaper. Cost is one of the most important factors to be considered all around.”
A3	<ul style="list-style-type: none"> “Making big changes to existing business processes is often a long journey and not easy, particularly when making necessary upheavals to business components that have been in place for many years.”
A4	<ul style="list-style-type: none"> “I think the pressure on the management, especially on the top management of construction companies, will certainly increase over time.” “Human resources face extreme challenges in the construction industry with more and more labor and a massive skill shortage. Furthermore, the sector has become less popular and less attractive to younger generations. Lack of career paths, gender problems and generational problems inhibit the industry’s attractiveness. These factors can lead an entire generation to never even entering the industry.”
A5	<ul style="list-style-type: none"> “I think the implementation is the main issue. The process is not easy as well, but implementation is the toughest thing.”
A6	<ul style="list-style-type: none"> “Companies operating in the modern business landscape are increasingly finding themselves managing more than just employees, customers, and products. Modern businesses must manage change. To do so, they need to change their management strategies. Yet, as with any drastic upheaval in an organization,

Interviewees	Comments
	<p>formulating a structured change management plan can be difficult. Employees may be reluctant to “try new things.” It can be tough to secure a budget as decision makers may not see the need to update processes which seem like they are working.”</p> <ul style="list-style-type: none"> • “90% of construction businesses at least are already paying for Word, Excel, and PowerPoint, and then you just teach them how to work on the same document at the same time, which is BIM.”
A7	<ul style="list-style-type: none"> • “AR has great potential to be adopted in the construction industry, provided that the obstacles hindering the adoption are resolved.”
A8	<ul style="list-style-type: none"> • “Several SMEs are facing a lacking workforce or in if they have an ageing workforce and we see that the constructions it is not attractive for younger generations.” • “Not just in the younger people are more attracted by anything that is digital electronics, and if the sector is completely lacking in that field is not just there, not sexy for them so that they go to other sectors.” • “I think that then they will invest in some of their work for security or must be trained to do this. I think this is very important. If they do not, if they are not convinced that they will have a benefit from new technology, they will just continue business as usual.”
A9	<ul style="list-style-type: none"> • “You know your competitive advantage should not be the data about the buildings you are constructing.”
A10	<ul style="list-style-type: none"> • “Subscription, and it is ridiculously expensive and less prohibitive when it comes to applying these digital technologies for the SMEs.”
A11	<ul style="list-style-type: none"> • “Many small contractors especially Bumiputera contractors are unwilling to adopt IBS in their construction business. They prefer to carry on using the traditional method of construction. The main reason for this is because of they are too familiar and comfortable with the traditional system and for them the technology suits well with small scale projects. Thus, they feel that there is no need to switch to IBS.” • “A high adoption rate for AR, VR and other technologies should be the aim of Malaysian construction businesses going into future to prepare themselves to compete in the global market.” • “They cannot say because they do not understand what is possible, so it is hard for them to see the big picture.”
A12	<ul style="list-style-type: none"> • “There is no organization that can avoid change. Change raises concerns because people fear economic losses, inconvenience, uncertainty, and disconnect from common social patterns. Almost every change in structure, technology, people, or strategy has the potential to disrupt patterns of interaction that are already comfortable.”
A13	<ul style="list-style-type: none"> • “SMEs construction companies need to have capital and knowledge in IBS, position themselves as a total IBS solution provider to clients, target projects with large volumes of building components, employ a small number of fulltime employees as well as to have inhouse capability and to outsource some facilities in the business operation.”
A14	<ul style="list-style-type: none"> • “Advanced technologies will be able to automate routine physical and interpersonal tasks, leaving humans to focus on more complex and novel tasks that require problem-solving abilities.”
A15	<ul style="list-style-type: none"> • “The construction industry is seen as an industry that does not really have career paths. That is partly because there are not always many kinds of joins to upskill people more, enable people to move within the industry to different disciplines.”
A16	<ul style="list-style-type: none"> • “Without any technology, just by organizing the work smartly, you can save 50% of all the time and using technology will boost it even further.”
A17	<ul style="list-style-type: none"> • “Also, for the consultants, things have become more complicated, and they have got a problem with the skill set. That thing risk now in producing these construction details, they end up getting things wrong, and people see them, but at the same time there is lots of good money in that.”
A18	<ul style="list-style-type: none"> • “A cloud based real-time project performance monitoring and reporting system will allow all stakeholders to be part of every stage of the project delivery process. Cloud adoption will allow project progress to be monitored in an open manner. The use of cloud platform to monitor project progresses will eliminate delays and block leakages arising from inaccessible information.” • “Once you can separate them and holistically, look at the building and then you are able to optimize it and change things and understand exactly the implications. So, it is about looking at the product and building a better product.”
A20	<ul style="list-style-type: none"> • “Construction, as an industry, is still learning that the industry needs to become more social. Construction has growing up to do in terms of the way that they treat their people, and I think that we are going to see a shortage of tech strong workforce because they are being pulled out by the technology companies.” • “Labor rates will rise because we must pay people more in order to get them interested. So, then construction costs of construction will go up because there is a direct relationship with the labor cost.”

6. Discussion

The discussion of the IR 4.0 concept amongst the construction SMEs received various impression from the interviewees based from the result in Table 3 above. For example, interviewee A6 mentioned that the introduction of the concept towards the industry is very good but there is a concern on how the execution will

be especially when it focuses towards the SMEs. The issue will arise due to the concern of limited financial ability of the organizations. Most of the interviewees acknowledged that shortage of financial resources is the most complicated and difficult challenges in implementing IR 4.0 for the SMEs. This is because a lot of the idea revolving around IR 4.0 requires the existence of advanced technologies and development that can enhance and improve the productivity of the construction businesses (Maskuriy et al., 2019). According to interviewee A11, the biggest challenge presented is that each SMEs was limited by a set number of resources and this slows down any technological adoption especially for new starting businesses. Cost is a significant barrier in the adoption of IT solutions by construction companies, because of its low-profit margin (Kumar et al., 2019) and most construction companies are seeking new ways to drive down infrastructure and operational costs (Bello et al., 2021).

The ability to address and adapt to change within an organization is becoming a critical element of survival for many modern businesses in the current digital transformation landscape. Management plays a huge role in the success of introducing new concept or methodology within the organization context (Agostini & Filippini, 2019). The sizes of the company can also affect how the adoption is going to be executed since the nature of the firms varies between small/medium and large sized enterprises (Schröder, 2016). Failure in digital transformation projects almost always comes down to a lack of preparation and strategy (Brunetti et al., 2020). Interviewee A8 highlighted that while preparing the workforce for IR 4.0, it is important to address skills shortages and lack of preparation for the workplace due to the difficulties with finding, training, and re-skilling staff. The accumulated feedbacks given by the interviewees in regards to the current work landscape, accentuate the current readiness of the SMEs in adopting the IR 4.0 concept and it showed that there is still much efforts needed to be done in order to make it a reality.

The physical and digital systems that exist nowadays were found to be very efficient however it comes with the risk of a cyber-attack (Li & Liu, 2021). When numerous machines and devices are connected to single or multiple networks, vulnerabilities in any one of those pieces of equipment could make the system vulnerable. Companies are not fully prepared to deal with these security threats, with many relying on their technology and solution providers to scope out vulnerabilities as commented by interviewee A18.

All interviewees acknowledged that BIM is a major propeller for the concept of IR 4.0 in the construction industry. Application of BIM is essential to drive the industry towards sustainable construction which underlines long term affordability, quality, and efficiency (Takim et al., 2013). Other emerging construction technique such as Industrialised Building System (IBS) was also pointed out throughout interview. IBS can improve quality, productivity, and efficiency of the construction project with the use of the factory-made product (Kamar et al., 2012). Yet the increase in IBS adoption in the Malaysian construction industry is causing concerns for companies especially contractors as it is potentially causing adverse effects on their business opportunities. The use of IBS would reduce many on-site activities and the number of on-site trades such as carpentry work, bricklaying, bar bending and manual on-site jobs (Theong et al., 2018).

More than half of the interviewees agreed that government and its agencies play the biggest roles in driving the IR 4.0 enablers in the construction industry. An initiative was introduced by the Malaysian Government in the Construction Industry Transformation Plan (CITP) whereby construction companies are urged to adopt innovative technologies in order to maintain their competitiveness in the market share and enhance the construction productivity. It is unquestionable that SMEs' companies have limited resources and thus, several incentives could be given to them by the government to help release them from the financial burden as recommended by interviewee A16. Interviewee A20 suggested that financial aids such as tax reduction and reduce or exempted from CIDB levy for BIM implementers were sought. Other forms of incentives (i.e., recognition to SME's company's implementing latest technologies; yearly rewards; and special awards) could motivate SMEs to be committed in adopting IR 4.0 technologies for their projects. All these rewards, awards, and certifications would give merit to SMEs contractors and will assist them to be further recognized by the government and other professional bodies. Overall, there is a clear, active, and yet unfinished discussion about IR 4.0 in the current landscape of the construction industry.

7. Conclusion

The implementation of IR 4.0 for the construction industry is becoming a huge interest around the sector as of this moment. Nevertheless, much work is needed in order to ensure that the implementation can be realised especially for the SMEs. Based from this research, a couple of things that needs to be pointed out is that challenges need to be addressed and dealt with. The lack of financial backup, ineffective process changes

strategy and lack of experiences in utilizing skilled applications and technologies are the main challenges in the adoption of IR 4.0 for the SMEs. Absence of a process change strategy can slow down the implementation efforts and not only that, utilization of new innovative technologies requires comprehensive training and time.

On a positive note, technologies such as BIM, cloud technology and IBS is becoming a growing trend in the construction industry yet the adoption and practice amongst the SMEs are still quite low. In regards to security, there is a need to implement a robust security system to protect organizations against hacking and unintentional data breaches in preparing for the implementation of IR 4.0. The current readiness of the IR 4.0 concept for the construction SMEs is still below par yet there is still potential to be improved especially in terms of the organisations management, awareness, and implementation level.

Government and its agencies such as CIDB play the biggest roles as the driving force in ensuring advanced technologies are successfully implemented in the construction industry. Having a guideline, roadmap or a policy that focuses on the construction sector for IR 4.0 adoption is an important step towards the adoption of IR 4.0 for the construction industry. The results from this research shall be used in producing a framework for the adoption of IR 4.0 for the construction SMEs in the near future.

References

- Agostini, L., & Filippini, R. (2019). Organizational and managerial challenges in the path toward Industry 4.0. *European Journal of Innovation Management*, 22(3), 406–421. <https://doi.org/10.1108/EJIM-02-2018-0030>
- Al-Qutaifi, S., Nazari, A., & Bagheri, A. (2018). Mechanical properties of layered geopolymer structures applicable in concrete 3D-printing. *Construction and Building Materials*, 176, 690–699. <https://doi.org/10.1016/j.conbuildmat.2018.04.195>
- Alaloul, W. S., Liew, M. S., Zawawi, N. A. W. A., & Kennedy, I. B. (2020). Industrial Revolution 4.0 in the construction industry: Challenges and opportunities for stakeholders. *Ain Shams Engineering Journal*, 11(1), 225–230. <https://doi.org/https://doi.org/10.1016/j.asej.2019.08.010>
- Arthur-Aidoo, B. M., Aigbavboa, C., & Thwala, W. (2015). *Framework For Growth Of Small And Medium-Size Construction Firms*.
- Bello, S. A., Oyedele, L. O., Akinade, O. O., Bilal, M., Davila Delgado, J. M., Akanbi, L. A., Ajayi, A. O., & Owolabi, H. A. (2021). Cloud computing in construction industry: Use cases, benefits and challenges. *Automation in Construction*, 122, 103441. <https://doi.org/https://doi.org/10.1016/j.autcon.2020.103441>
- Bin Tayib, M. A. A., Bakhary, nor azmi, Che Ibrahim, C. K. I., & Mustaffa, N. (2022). INDUSTRY 4.0 FOR THE SMALL AND MEDIUM-SIZED ENTERPRISES IN THE MALAYSIAN CONSTRUCTION INDUSTRY. *Journal of Surveying, Construction & Property*, 13, 20–33. <https://doi.org/10.22452/jscsp.2022no1.3>
- Brunetti, F., Matt, D. T., Bonfanti, A., De Longhi, A., Pedrini, G., & Orzes, G. (2020). Digital transformation challenges: strategies emerging from a multi-stakeholder approach. *TQM Journal*, 32(4), 697–724. <https://doi.org/10.1108/TQM-12-2019-0309>
- Construction Industry Development Board (CIDB). (2011). *Construction Quarterly Statistical Bulletin: Third Quarter 2011*.
- Construction Industry Development Board (CIDB). (2021). *Construction 4.0 Strategic Plan (2021-2025)*.
- Davies, A., Sharp, D., & Bean, S. (2014). *RICS Strategic Facilities Management Case Studies* (Issue October). <https://www.rics.org/globalassets/rics-website/media/qualify/accreditations/rics-strategic-fm-case-studies-june-2015.pdf>
- Davis, N. (2016). *What is the fourth industrial revolution?* World Economic Forum. <https://www.weforum.org/agenda/2016/01/what-is-the-fourth-industrial-revolution>
- Department of Statistics Malaysia (DOSM). (2019). Quarterly Construction Statistics, Third Quarter 2019. In *Department of Statistics, Malaysia*. <https://www.dosm.gov.my/v1/index.php?r=column/pdfPrev&id=UjBmbXdaVldnY0hJamdXcEdjSStMZz09>
- Economic Planning Unit. (2021). *National 4IR Policy*.
- European Commission. (2016). *The European construction sector: a global partner*. European Union.
- Global Construction Perspectives, & Oxford Economics. (2015). *Global Construction Perspectives and Oxford Economics, A Global Forecast for the Construction Industry by 2030*. https://policy.ciob.org/wp-content/uploads/2016/06/GlobalConstruction2030_ExecutiveSummary_CIOB.pdf
- Hagaman, A. K., & Wutich, A. (2016). How Many Interviews Are Enough to Identify Metathemes in Multisited and Cross-cultural Research? Another Perspective on Guest, Bunce, and Johnson's (2006) Landmark Study. *Field Methods*, 29(1), 23–41. <https://doi.org/10.1177/1525822X166640447>
- Kamal, E. M., & Flanagan, R. (2014). Key characteristics of rural construction SMEs. *Journal of Construction in Developing Countries*, 19(2), 1–13.
- Kamar, K. A. M., Hamid, Z. A., & Dzulkalnine, N. (2012). Industrialised Building System (IBS) construction: Measuring the perception of contractors in Malaysia. *2012 IEEE Business, Engineering & Industrial Applications Colloquium (BEIAC)*, 328–333. <https://doi.org/10.1109/BEIAC.2012.6226077>

- Kolberg, D., Knobloch, J., & Zühlke, D. (2016). Towards a lean automation interface for workstations. *International Journal of Production Research*, 55, 2845–2856. <https://doi.org/10.1080/00207543.2016.1223384>
- Kumar, S., Tiwari, P., & Zymbler, M. (2019). Internet of Things is a revolutionary approach for future technology enhancement: a review. *Journal of Big Data*, 6(1), 111. <https://doi.org/10.1186/s40537-019-0268-2>
- Li, Y., & Liu, Q. (2021). A comprehensive review study of cyber-attacks and cyber security; Emerging trends and recent developments. *Energy Reports*, 7, 8176–8186. <https://doi.org/https://doi.org/10.1016/j.egy.2021.08.126>
- Maskuriy, R., Selamat, A., Ali, K. N., Maresova, P., & Krejcar, O. (2019). Industry 4.0 for the Construction Industry—How Ready Is the Industry? *Applied Sciences*, 9(14), 2819. <https://doi.org/10.3390/app9142819>
- Matt, D. T., & Rauch, E. (2020). *SME 4.0: The Role of Small- and Medium-Sized Enterprises in the Digital Transformation BT - Industry 4.0 for SMEs: Challenges, Opportunities and Requirements* (D. T. Matt, V. Modrák, & H. Zsifkovits (eds.); pp. 3–36). Springer International Publishing. https://doi.org/10.1007/978-3-030-25425-4_1
- Roblek, V., Meško, M., & Krapež, A. (2016). A Complex View of Industry 4.0. *SAGE Open*, 6(2), 2158244016653987. <https://doi.org/10.1177/2158244016653987>
- Roland Berger. (2016). Digitization in the construction industry. *Roland Berger GmbH*, 16. https://www.rolandberger.com/publications/publication_pdf/tab_digitization_construction_industry_e_final.pdf
- Rotar, L. J., Pamić, R. K., & Bojnec, Š. (2019). Contributions of small and medium enterprises to employment in the European Union countries. In *Economic Research-Ekonomska Istrazivanja* (Vol. 32, Issue 1, pp. 3296–3308). <https://doi.org/10.1080/1331677X.2019.1658532>
- Schröder, C. (2016). The challenges of industry 4.0 for small and medium-sized enterprises. *Friedrich-Ebert-Stiftung: Bonn, Germany*.
- Sekaran, U., & Bougie, R. (2009). *Research Methods for Business: A Skill Building Approach* (5th Edition). *International Journal of Information Technology and Management - IJITM*.
- Takim, R., Harris, M., & Nawawi, A. H. (2013). Building Information Modeling (BIM): A New Paradigm for Quality of Life Within Architectural, Engineering and Construction (AEC) Industry. *Procedia - Social and Behavioral Sciences*, 101, 23–32. <https://doi.org/https://doi.org/10.1016/j.sbspro.2013.07.175>
- Theong, M., Rashid, R., & CHAI, saar. (2018). Implication of Industrialised Building System (IBS) : The Case of Trade Contractors in Malaysia. *International Journal of Engineering & Technology*, 7, 766. <https://doi.org/10.14419/ijet.v7i2.29.14253>
- Vogel-Heuser, B., & Hess, D. (2016). Guest Editorial Industry 4.0—Prerequisites and Visions. *IEEE Transactions on Automation Science and Engineering*, 13, 1–3. <https://doi.org/10.1109/TASE.2016.2523639>
- World Economic Forum, & The Boston Consulting Group. (2018). Future Scenarios and Implications for the Industry. In *The Boston Consulting Group* (Issue March). http://www3.weforum.org/docs/Future_Scenarios_Implications_Industry_report_2018.pdf

Navigating the Intersection of Innovation and Cybersecurity: A Framework

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Abstract: Reliance on digital technologies for innovation management is unavoidable in current contexts. While digital processes and business models have been prioritised as key factors to drive innovation and value creation within firms, cybersecurity concerns are still rife. Increased levels and severity of cybersecurity breaches (CSBs) have had adverse effects on trust, caused significant revenue losses, and inflicted reputational damage on many firms. Further exacerbating these concerns is an observation made in the Global Risks Report of 2022, the World Economic Forum: cybersecurity measures taken by businesses are becoming increasingly obsolete. Many firms face severe consequences without implementing strategic objectives to limit the threats posed by CSBs. Cybersecurity breaches (CSBs) have a significant long-term impact on firm-level innovation and investment decisions. However, many firms are reluctant to examine or enhance their existing cybersecurity practices because of concerns that they may limit their innovation ability. Determining a method to limit CSBs and retain capabilities to perform necessary innovative processes is a delicate balance, with trade-offs to be considered within each process. This paper aims to address the delicate balance between limiting CSBs and preserving the ability to undertake necessary innovative processes. Building upon the Cyber Security Maturity and Innovation matrix introduced by Nelson and Madnick (2017), this paper expands the framework by providing specific suggestions for each quadrant. The matrix classifies firms into different quadrants based on their reliance on innovation and their assessment of cyber risk. We then detail measures to improve cybersecurity maturity for firms in each quadrant, incorporating the National Institute of Standards and Technology (NIST) Cybersecurity Framework Version 1.1 (CSF) as a reference. By making well-informed decisions and implementing appropriate measures, firms can effectively mitigate CSB risks while continuing to drive innovation and create value. This expanded framework serves as a valuable tool for firms seeking to align their cybersecurity practices with their innovation objectives, in accordance with the NIST CSF.

Keywords: Cybersecurity, Innovation, Digital technologies, Risk management, Framework.

1. Background and Introduction

In recent years, reliance on digital technologies for innovation has become an essential part of business operations. Innovation and cybersecurity are critical components of modern business operations, and their intersectionality has become increasingly relevant in recent years. With increasing use of digital processes and business models, cybersecurity concerns have become a prevalent issue for many firms. Cybersecurity Breaches (CSBs), cybercrime, ransomware attacks and other cybersecurity incidents have been increasing in frequency. More than 83% of organisations included in IBM's Data Breach Report have experienced more than one data breach (IBM, 2022). The report also highlights that the severity of these attacks, as well as associated costs, can have significant financial impacts on the business; the increase in severity and cost of these incidents can mean that it can take months or even years for a business to recover from the impact of a breach.

Cybercrime and CSBs are expected to incur a 15% increase in the associated costs, reaching \$10.5 trillion by 2025. Annual costs are expected to reach \$8 per annum by the end of 2023 (Cybersecurity Ventures, 2022). The report further highlights the growing threat of cybercrime and the increasing sophistication of cybercrime. Further issues compounding these concerns are stated in the Global Risks Report of 2022, the World Economic Forum: cybersecurity measures taken by businesses are becoming increasingly obsolete (World Economic Forum, 2022). CSBs can influence future strategic decisions involving firm-level investment and innovation decisions; CSBs have been linked to a 10% decline in Research and Development, as well as decreasing investment efficiency for up to four years following a breach (He et al., 2020). Most firms are ill-equipped to deal with a CSB; this is further exacerbated by CSB contagion effects where managerial ability and internal control deficits within a firm in the same industry may ripple through to others once a CSB has taken place (Kelton & Yang, 2023).

Despite the clear adverse implications of a CSB, many firms are hesitant to enhance their cybersecurity posture because of the fear of limiting their ability to innovate (Auyporn et al., 2020). In surveys reviewed by Madnick and Nelson, firms tended to indicate one of three viewpoints regarding the intersection of innovation and cybersecurity. Some firms indicate that stringent cybersecurity has a negative and limiting impact on innovation; some believe that efforts can be well-balanced; and finally, some respondents indicated that firms are taking too many cyber risks in the name of innovation. Given the significant financial and reputational risks associated

with CSBs, businesses must adopt a proactive approach to managing their cybersecurity risks, preferably one that balances the need for innovation and cybersecurity. A carefully considered approach must be followed on a per-firm basis to develop a framework that considers the cybersecurity maturity of a firm along with its innovation requirements.

The framework proposed in this paper builds upon the finding in Nelson and Madnick's work, "Studying the Tension between Digital Innovation and Cybersecurity" (Nelson & Madnick, 2017) and integrates it with the National Institute for Standards and Technology (NIST) Cybersecurity Framework Version 1.1 (CSF) (National Institute of Standards and Technology, 2018).

Nelson and Madnick's work relies on survey responses conducted from December 2015 to January 2016. The survey consists over 54 diverse organisations. The participants' demographics were diverse across regions: 21 participants were from Asia/Pacific, 10 from Europe/Africa, 2 from Latin America, and 21 from North America. Various industries were surveyed, 16 in total. Organisations ranged in size from small (<1000 employees), medium (1,000-9,999 employees) and large (>10,000). To address the lack of common metrics that define cybersecurity maturity and technological innovations in companies, the survey questions were designed as proxies for these measures. Two survey techniques were employed to enhance accuracy. Firstly, the questions focused on executives' activities within the past 12 months to ensure responses were based on recent experiences rather than perceptions. Secondly, specific examples were provided for each question to make them more concrete and encompass a wide range of possibilities. Figure 1 provides an indication of the number of companies per quadrant, as determined by the surveys conducted by Nelson and Madnick.

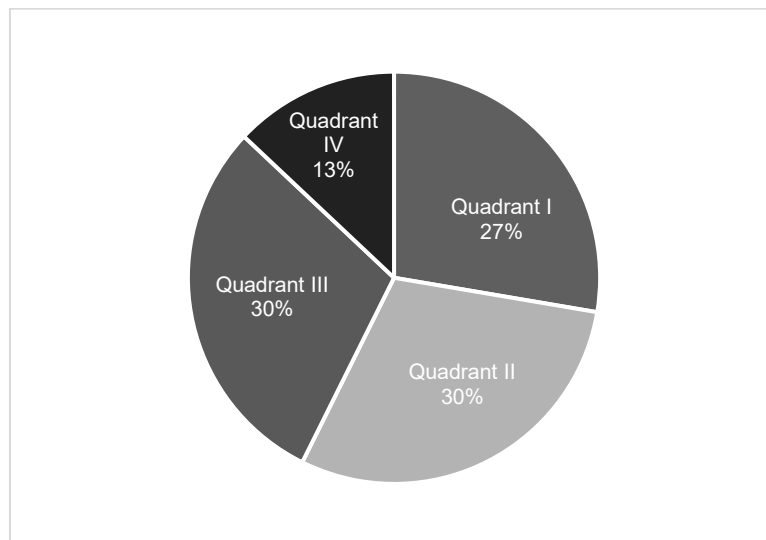


Figure 1 Proportion of companies per quadrant (Nelson & Madnick, 2017)

The paper is organised as follows: First, a brief background and introduction discuss the pertinence of developing a CSF that considers the intersectionality of innovation and cybersecurity. Next, Both Madnick & Nelsons Innovation and Maturity matrix and the NIST CSF are detailed in Section **Error! Reference source not found.** The CSF is detailed for each quadrant in Section 3. Section 4 discusses limitations and opportunities for future research⁴. Finally, Section 5 concludes the paper and discusses the implications and suggestions associated with the framework.

2. Framework introduction

Extending a framework to provide guidelines for firms according to their position on the Cybersecurity Maturity and Innovation matrix requires nuance and flexibility on a per-firm basis. This framework does not intend to be prescriptive per se, but provides a guideline that can be adapted according to the specific needs of the firm. The goal of the framework is to provide recommendations that can be implemented by firms depending on their identified quadrant, which can help mitigate the risks associated with CSBs.

ISO/IEC 27032:2012 defines *cybersecurity* as the preservation of confidentiality, integrity, and availability of information within complex environments, wherein people, services, and software interact on the Internet using technology devices and connected networks (ISO/IEC, 2012). Cybersecurity is often used interchangeably with other terminology in the field of security; it includes network security, information security, and Internet

security. Following the same approach as researchers (Azmi et al., 2018), this paper considers cybersecurity to mean “securing a virtual digital environment by governance, management and assurance, including its assets (i.e. information assets and cyber assets), entities (such as end users, organizations, governments, societies, machines and software), and interactions (enabled by IT infrastructure, communications/networks, systems, and devices)”.

NIST CSF V1.0 is a voluntary framework that provides a set of guidelines and best practices or standards for improving cybersecurity risk management across various industries. This framework is a valuable resource for organisations seeking to improve their cybersecurity risk management processes and enhance their overall cybersecurity posture (Shen, 2014). The latest version, 2.0, is under review at the time of writing; thus, V1.1 CSF will be used in this paper. The NIST CSF has become the standard method of facilitating cybersecurity risk management within many organisations; The NIST CSF is popularly used as it emphasises organisation-specific recommendations within the framework (Gordon et al., 2020). NIST CSF includes five core functions: Identify, Protect, Detect, Respond and Recover.

The five core functions provided by the NIST CSF, when considered together, provide a comprehensive review of cyber risk management over its lifecycle. Each aspect represents a different element of risk management and can be broken down as follows (Mahn et al., 2023):

1. Identify: Developing an organisational understanding required to manage risk across relevant assets, data, and capabilities.
2. Protect: Developing and implementing appropriate safeguards to ensure the required service delivery.
3. Detect: Developing and implementing the appropriate activities required to identify occurrences of cybersecurity events.
4. Respond: Developing and implementing appropriate activities required to take action regarding detected cybersecurity events.
5. Recover: Developing and implementing appropriate activities required to restore any capabilities that have been impaired owing to the detected cybersecurity event, as well as maintaining plans for resilience.

Each core structure contains categories, subcategories, and informative resources. This is illustrated in Figure 2. The proposed framework focuses on the core functions and provides several categories. The highest level of organising basic cybersecurity activities was achieved through the functions described above. They help organisations manage cybersecurity risks by organising information, making risk-management decisions, addressing threats, and learning from previous activities. These functions also align with the existing incident management methodologies and demonstrate the impact of cybersecurity investments. Categories, however, are subdivisions of functions that group cybersecurity outcomes according to programmatic needs and specific activities. Examples of these categories include Asset Management, Identity Management and Access Control, and Detection Processes (National Institute of Standards and Technology, 2018).



Figure 2 NIST CSF Framework Core Structure (National Institute of Standards and Technology, 2018)

The framework is intentionally broad and flexible. It provides a macro-overview of how cybersecurity risk management should be approached, while specific implementations and details must be determined by the firm

and its organisational requirements. The NIST CSF is also utilised in this study to provide recommendations in the context of Nelson and Madnick's Cybersecurity Maturity and Innovation matrix.

3. Proposed Framework

The proposed framework is divided into four categories: low innovation/low cybersecurity maturity (beginners), low innovation/high cybersecurity maturity (secure conservatives), high innovation/low cybersecurity maturity (reckless innovators), and high innovation/high cybersecurity maturity (secure digital innovators). This is illustrated in **Figure 3**.

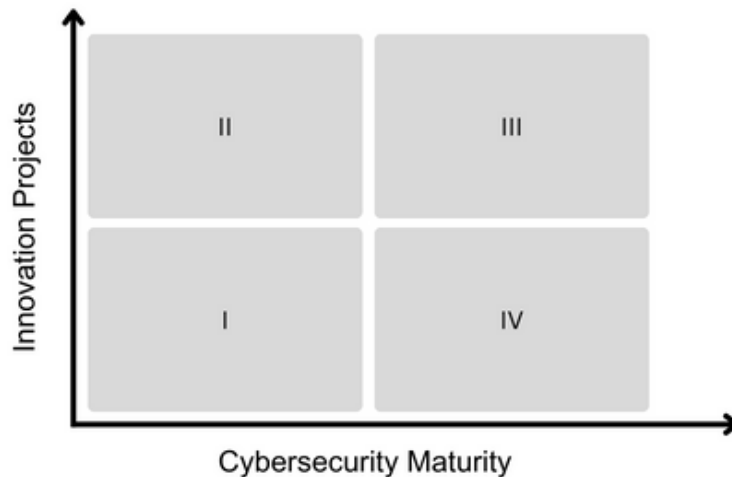


Figure 3 Cybersecurity Maturity and Innovation Matrix (Nelson & Madnick, 2017)

Quadrant I and IV firms would likely need to address all five core aspects of the NIST CSF, as discussed in sections 3.1 and 3.2. Recommendations for these quadrants describe the different approaches that both quadrants could follow. Quadrants II and III would likely have robust cybersecurity controls in place addressing the five core NIST CSF recommendations; however, each quadrant may have unique problems that may still need to be addressed. This is discussed in sections 3.3 and 3.4.

3.1 Quadrant I Firms

Quadrant firms are characterised by both low technology innovation and low cybersecurity maturity. Organisations in this quadrant are likely to have weaker cybersecurity controls in place, making them vulnerable to cyber threats, even if they have lower technological maturity. Firms with low technological innovation must still make use of various digitised processes; firms that use only basic utility technologies are increasingly scarce (Nelson & Madnick, 2017).

Many firms within this quadrant identify themselves as start-up firms. For start-up firms, it is essential to implement the necessary cybersecurity controls from the start. Startup firms working towards becoming a fully-fledged business often make similar cybersecurity mistakes that can result in costly CSBs (Starikova, 2022). Further, nascent firms face unique problems that are often easily overcome by their larger, more mature counterparts (Chandna & Tiwari, 2023).

The first step that firms within this quadrant must take is the implementation of robust, basic cybersecurity controls to protect digital and physical assets. Using NIST CSF, it is recommended that firms in this quadrant implement basic cybersecurity controls based on their specific risks and requirements. This can involve setting up security controls such as antivirus software, firewalls, and Intrusion Detection Systems (IDSs).

As the cybersecurity maturity for these firms is low, each of the NIST CSF's five core functions must be addressed (Mahn et al., 2023):

1. Identify classifying assets that need to be protected. This can include critical enterprise processes and assets, document information flows, maintaining hardware or software inventories, and establishing policies with relevant roles and responsibilities.
2. Protect: Implementing access control and firewalls to protect sensitive data, managing access to assets and information, and conducting regular backups.

3. Detect: Monitoring networks for potential security threats and testing or updating detection processes within the network.
4. Respond: Implement an incident response plan, which should include a procedure for detecting, containing, and responding to an incident. The plan must be updated and plans must be tested.
5. Recover: Develop a business continuity plan detailing steps to recover from an incident that may occur in a timely manner. Communication between internal and external stakeholders must be clearly defined.

Care must be taken during the response and recovery phases. Firms in this quadrant might struggle significantly more than others to recover from a cybersecurity incident, particularly if these measures have not been implemented.

When considering the risk-based approach recommended by NIST, ongoing assessments and continuous improvement of system implementation should be prioritised by firms within this quadrant. Additionally, organisations within this quadrant should consider awareness training, focusing on basic cybersecurity best practices. It is recommended that the training offered is appropriate for the target audience while still reaching the largest audience possible, while maintaining a favourable cost/performance ratio to ensure long-term sustainability (Gkioulos & Chowdhury, 2021). Essential skills and knowledge within this quadrant may include social engineering knowledge (protecting information from phishing, spoofing, ransomware, etc.) to mitigate financial losses, identity theft, and reputational damage. Various free or low-cost awareness training solutions are available (National Institute of Standards and Technology, 2020), which is a particular advantage for start-up firms.

3.2 Quadrant II Firms

Quadrant two firms are characterised by high technological innovation but low cybersecurity maturity. These firms may be highly innovative, but their cybersecurity posture may not be sufficiently mature to protect their assets. Such firms are particularly vulnerable to a wide range of cybersecurity threats.

Companies within this quadrant vary in size and comprise the smallest section of firms analysed by Nelson and Madnick (2017).

Nelson and Madnick indicate that firms within this quadrant may implicitly accept higher levels of risk and are prepared to deal with the consequences of a potential CSB. Another possibility is that companies may not fully understand the risks they accept. A study performed by Gartner researched the effectiveness of chief information security officers (CISOs) across four categories. Only 12% of the surveyed CISOs were deemed highly effective across all the categories. Gartner further indicated that only 66% of these top-performing CISOs collaborate with senior business decision-makers to accurately define the organisation's risk appetite (Gartner, 2020). If business decision-makers are unaware of acceptable risk levels, this may further exacerbate implicit, unwanted risk acceptance.

Like quadrant one firms, all aspects of the NIST CSF should be considered and implemented to improve the cybersecurity posture, as discussed below:

1. Identify classifying assets that need to be protected. This can include critical enterprise processes and assets, document information flows, maintaining hardware or software inventories, and establishing policies with relevant roles and responsibilities. A thorough risk assessment is required to identify vulnerabilities related to innovative technologies.
2. Protect: Implementing access control such as multi-factor authentication and firewalls to protect sensitive data, manage access to assets and information, and conduct regular backups.
3. Detect: Monitoring networks for potential security threats and testing or updating detection processes within the network. Implementing an intrusion detection and prevention system (IDPS) to monitor network traffic or security information and event management (SIEM) to centralise log monitoring and analysis.
4. Respond: Implement an incident response plan, which should include a procedure for detecting, containing, and responding to an incident. The plan must be updated and plans must be tested. Tabletops or simulated exercises can be performed to verify the efficacy of the response plan.
5. Recover: Develop a business continuity plan detailing steps to recover from an incident that may occur in a timely manner. Communication between internal and external stakeholders must be clearly defined.

Firms likely find themselves within this quadrant because of the friction between cybersecurity and innovation. A global survey found that various organisations may know how to improve their security position but choose to forgo the adoption of new applications or technologies to speed up core business processes (Ponemon Institute, 2016). Respondents indicated that while most organisations recognise the importance of adequate cybersecurity controls, access management and governance processes to support these digitisation practices are not yet in place.

3.3 Quadrant III Firms

Quadrant three firms are characterised by low technological innovation and high cybersecurity maturity. This quadrant comprises the lowest number of firms surveyed by Madnick and Nelson. Some of these firms either find themselves in an industry with less competitive pressure or where an intentional “slow follower” strategy is adopted. This method is employed especially in industries where the appetite is very low, such as nuclear power plants.

Some firms within the “slow follower” category were industrial firms. A study performed by Honeywell indicated that many organisations within this sector still have a long way to go regarding the adoption of current cybersecurity technologies. The majority of the surveyed firms only had a firewall between the plant and business systems. Less than a third of the respondents did not have proper access control or authentication methods implemented across their systems (Honeywell, 2017). The report stressed that many companies within these industries self-reported their cybersecurity posture to be higher than it may be in reality.

Although these firms may take the necessary precautions and have a well-rounded cybersecurity posture, cyber threats evolve faster than they can be assessed (Kettani & Wainwright, 2019). Adopting a slow follower approach may not be the correct approach in the current cybersecurity landscape. Organisations within quadrant two should focus on the continuous improvement of their cybersecurity posture. This could include adopting increasingly automated threat analysis and response. Artificial intelligence and machine learning technologies are essential for providing dynamic, automated, and up-to-date analytics by utilising data analysis. This can be leveraged to address the insufficient response of many traditional security systems when faced with the rapid proliferation of new cyber risks (Sarker, 2022).

In enterprise risk management, internal audits or user training can address issues of complacency regarding cybersecurity policies. Some technology users within a firm may deem themselves vulnerable to exploits or cyber risks, or engage in workarounds to side-step formal cybersecurity policies (Stafford et al., 2018). Considering the increased speed at which cyberthreats evolve, the two quadrants should focus on both the identity and protection functions of the NIST CSF.

3.4 Quadrant IV Firms

Quadrant three firms are characterised by both high technology innovation and cybersecurity maturity, consisting mostly of medium and large firms (Nelson & Madnick, 2017). In the surveys conducted, the firms noted the necessity of cyber-risk mitigation while building digital capacity and capabilities.

Medium-to-large firms are likely to have the correct procedures in place to respond to these threats when compared to small firms. Most large companies already have response plans in place; 81% of firms with more than \$1 billion in revenue have a cybersecurity program in place, with a response plan forming part thereof (Sloan, 2020).

To improve the firm’s capability to perform core functions (Identify), continuous improvement should be prioritised (Mahn et al., 2023). Learning goals and objectives for the cyber team or organisation should be defined and aligned with organisational needs and goals. Regular audits and gap assessments should be performed on both processes, as well as within the cyber team or organisation (Acartürk et al., 2021).

4. Discussion

Examining Nelson and Madnick’s quantification of the tension between digital innovation and cybersecurity through the lens of the NIST CSF provides recommendations for improving the cybersecurity posture of various firms. A primary limitation of this framework is the assumption that firms are able to correctly determine their cybersecurity posture. Many firms struggle to accurately define their posture, often overestimating the effectiveness of cybersecurity solutions. Substantial investments in cybersecurity technology and a high level of

awareness among senior executives have led to the exploitation of vulnerabilities and CSBs. This is largely because of the fundamental intricacies of cybersecurity, and the rigorous steps required to achieve this are underestimated. Cybersecurity practices can devolve into an exercise of ticking specific boxes rather than building the strategic capabilities needed to have true cyber resilience (Ford & Ali, 2020).

This study does not aim to be prescriptive, but to provide some insight into the actions that could be taken by firms within different quadrants of Nelson and Madnick's work. It is essential for firms to determine their cybersecurity posture accurately. Various tools are available to assist in the assessment and auditing of an organisation's cyber posture. Some of these tools, such as *the Axio Cybersecurity Program Assessment Tool*, are available free of charge. Other tools, such as the Information Systems Audit and Control Association's *Implementation of the NIST Cybersecurity Framework and Supplementary Toolkit* or SACA's *Cybersecurity: Based on the NIST Cybersecurity Framework*, provide best practices for security audits, compliance, and communication (National Institute of Standards and Technology, 2022).

5. Conclusion

The intersection of cybersecurity and digital innovation has become increasingly relevant in recent years, and digital technologies play a crucial role in business operations (Nelson & Madnick, 2017). The rising adoption and use of digitised business models has brought about cybersecurity concerns as the prevalence, severity, and frequency of CSBs have increased. These incidents not only result in financial losses but may also impact a firm's ability to innovate or make strategic decisions in the years following a severe CSB.

Despite the clear risk associated with CSBs, many firms are hesitant to enhance their cybersecurity posture because of fear of limiting their innovation capabilities. However, it is crucial for firms to try to find a balance between these two concepts. Nelson and Madnick indicate that only 13% of companies surveyed believe that they have struck the correct balance between cybersecurity maturity and innovation.

This paper proposes a framework that integrates the Cybersecurity Maturity and Innovation matrix proposed by Nelson and Madnick with the National Institute of Standards and Technology (NIST) Cybersecurity Framework. The framework provides guidelines for firms based on their position in the matrix and recommends specific cybersecurity measures to mitigate the risks associated with breaches. Firms placed within quadrants I and II are in a precarious position with low cybersecurity maturity. These firms are likely to need to address all aspects of the NIST Cybersecurity Framework to improve their cybersecurity posture. Quadrant III and IV firms, with higher cybersecurity maturity, should continue to maintain a well-rounded cybersecurity posture and stay updated with evolving threats.

Both this paper and the work done by Nelson and Madnick assume that companies can correctly ascertain their cybersecurity posture. An area where further research is required is the proliferation and development of accurate cybersecurity posture assessments. Although many tools are available, most firms still struggle to accurately determine their posture. A Bain & Company survey indicates that only 43% of executives believe that their firms follow cybersecurity best practices. A deeper analysis indicated that only 24% of these firms met the bar, indicating that numerous executives or companies believe they have a better cybersecurity posture than they truly do (Ford & Ali, 2020).

In practice, various factors might affect the quadrant in which a firm is placed. This can include technology management practices (such as organisational structure or legacy architectures) or industry-related factors (such as regulatory environments or innovation pressures). The proposed framework is adaptable and allows firms to tailor their cybersecurity measures based on their specific needs. This emphasises the importance of ongoing assessments, continuous improvement, and employee awareness training.

References

- Acartürk, C., Ulubay, M., & Erdur, E. (2021). Continuous improvement on maturity and capability of Security Operation Centres. *IET Information Security*, 15(1). <https://doi.org/10.1049/ise2.12005>
- Auyorn, W., Piromsopa, K., & Chaiyawat, T. (2020). Critical factors in cybersecurity for SMEs in technological innovation era. *ISPIM Conference Proceedings, March*.
- Azmi, R., Tibben, W., & Win, K. T. (2018). Review of cybersecurity frameworks: context and shared concepts. *Journal of Cyber Policy*, 3(2), 258–283. <https://doi.org/10.1080/23738871.2018.1520271>
- Chandna, V., & Tiwari, P. (2023). Cybersecurity and the new firm: surviving online threats. *Journal of Business Strategy*, 44(1). <https://doi.org/10.1108/JBS-08-2021-0146>
- Cybersecurity Ventures. (2022). *2022 Official Cybercrime Report*.

- Ford, F., & Ali, S. (2020). *Most Companies Overestimate Their Cybersecurity, but Resilience Is Possible*. <https://www.bain.com/insights/most-companies-overestimate-their-cybersecurity-but-resilience-is-possible/>
- Gartner. (2020). *Gartner 2020 CISO Effectiveness Survey*.
- Gkioulos, V., & Chowdhury, N. (2021). Cyber security training for critical infrastructure protection: A literature review. In *Computer Science Review* (Vol. 40). <https://doi.org/10.1016/j.cosrev.2021.100361>
- Gordon, L. A., Loeb, M. P., & Zhou, L. (2020). Integrating cost-benefit analysis into the NIST cybersecurity framework via the Gordon-Loeb model. *Journal of Cybersecurity*, 6(1). <https://doi.org/10.1093/CYBSEC/TYAA005>
- He, C. Z., Frost, T., & Pinsker, R. E. (2020). The impact of reported cybersecurity breaches on firm innovation. *Journal of Information Systems*, 34(2). <https://doi.org/10.2308/isis-18-053>
- Honeywell. (2017). *Overcoming the Industrial Cyber Security Skills Gap Facing the Process Industries*.
- IBM. (2022). *Cost of a Data Breach Report*.
- ISO/IEC. (2012). ISO 27032 Information technology - Security techniques - Guidelines for cybersecurity. *International Organization for Standardization*.
- Kelton, A., & Yang, Y.-W. (2023). *Understanding cybersecurity breach contagion effects: The role of the loss heuristic, managerial ability, and internal controls*. <https://ssrn.com/abstract=4379322>
- Kettani, H., & Wainwright, P. (2019). On the top threats to cyber systems. *2019 IEEE 2nd International Conference on Information and Computer Technologies, ICICT 2019*. <https://doi.org/10.1109/INFOCT.2019.8711324>
- Mahn, A., Marron, J., Quinn, S., & Topper, D. (2023, January 23). *Quick Start Guide*. NIST Special Publication 1271. <https://www.nist.gov/cyberframework/getting-started/quick-start-guide>
- National Institute of Standards and Technology. (2018). *Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1*. <https://doi.org/10.6028/NIST.CSWP.04162018>
- National Institute of Standards and Technology. (2020, April 7). *Free and Low Cost Online Cybersecurity Learning Content*. NICE Program Office. <https://www.nist.gov/itl/applied-cybersecurity/nice/resources/online-learning-content>
- National Institute of Standards and Technology. (2022, October 7). *Assessment & Auditing Resources*. National Institute of Standards and Technology Cybersecurity Framework. <https://www.nist.gov/cyberframework/assessment-auditing-resources>
- Nelson, N., & Madnick, S. (2017). Studying the tension between digital innovation and cybersecurity. *AMCIS 2017 - America's Conference on Information Systems: A Tradition of Innovation, 2017-August*.
- Ponemon Institute. (2016). *Global Trends in Identity Governance & Access Management*.
- Sarker, I. H. (2022). Machine Learning for Intelligent Data Analysis and Automation in Cybersecurity: Current and Future Prospects. In *Annals of Data Science*. <https://doi.org/10.1007/s40745-022-00444-2>
- Shen, L. (2014). The NIST Cybersecurity Framework Overview and Potential Impacts. In *The SciTech Lawyer* (Vol. 10, Issue 4).
- Sloan, R. (2020, June 21). *Which Industries Aren't Ready for a Cyberattack?* The Wall Street Journal. <https://www.wsj.com/articles/the-industries-most-vulnerable-to-cyberattacksand-why-11592786160>
- Stafford, T., Deitz, G., & Li, Y. (2018). The role of internal audit and user training in information security policy compliance. *Managerial Auditing Journal*, 33(4). <https://doi.org/10.1108/MAJ-07-2017-1596>
- Starikova, A. (2022, February 9). *Typical startup cybersecurity mistakes*. Kaspersky Daily. <https://www.kaspersky.com/blog/startup-cybersecurity-mistakes/43559/>
- World Economic Forum. (2022). *The Global Risks Report 2022*. World Economic Forum.

Autoethnography as a Research Method in Happiness Studies

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Abstract: The pursuit of happiness is a fundamental human goal that has been studied by philosophers, theologians, and scientists for centuries. Despite its universal importance, the definition and means of achieving happiness vary greatly across cultures and individual experiences (Uchida, Norasakkunkit and Kitayama, 2004). Cultures have different beliefs, values, and customs that shape their understanding of happiness. For example, some cultures may place a higher value on material wealth and success, while others may prioritize spiritual fulfilment or strong relationships (Joshnloo and Weijers, 2014). In this autoethnographic paper, I reflect on my own personal journey towards happiness during a one-year travel across 22 countries within southern Africa, southeast Asia, and south America, focusing on the first part of the trip – southern Africa. Autoethnography is a qualitative research method that involves the researcher reflecting on their personal experiences and cultural positionality in order to understand and analyse cultural phenomena (Bunyan, 2021). It combines elements of autobiography and ethnography, as the researcher uses their own experiences as a way to explore and understand the cultural context in which they participate (Hamilton, Smith and Worthington, 2008). Through the use of personal narrative and cultural analysis, I delve into the ways in which my own cultural background and societal expectations shaped my understanding of happiness. I also explore the ways in which immersing myself in a new culture and community impacted my pursuit of happiness and well-being. By reflecting on my own experiences and observations, I aim to shed light on the complexities of the pursuit of happiness and the potential for personal and cultural growth that can result from stepping outside of one's comfort zone. Through this autoethnographic lens, we hope to offer a unique and personal perspective on the pursuit of happiness, and to encourage readers to consider the cultural and individual factors that influence their own pursuit of this universal goal. We also reflect on how innovation and technology, essential to business, may not be as important to achieve happiness in certain contexts. This essay is a call for reflection on what truly matters in life.

Keywords: Autoethnography, Happiness, Well-being, Innovation.

1. Introduction

Autoethnography is a qualitative research method that involves the researcher reflecting on their personal experiences and cultural positionality in order to understand and analyze cultural phenomena (Bunyan, 2021). It combines elements of autobiography and ethnography, as the researcher uses their own experiences as a way to explore and understand the cultural context in which they participate (Hamilton, Smith and Worthington, 2008). It involves analyzing and interpreting these experiences, while also making connections between the author's insights and their own cultural identity, communication practices, traditions, symbols, emotions, values, and broader social, cultural, and political issues (Poulos, 2021). Essentially, autoethnography seeks to contextualize the personal within the broader social and cultural frameworks that shape our lives (Gant *et al.*, 2019).

The purpose of autoethnography is to provide a detailed and reflexive account of one's own experiences, while also exploring the social and cultural context that shaped those experiences. One of the key features of autoethnography is its emphasis on reflexivity. This means that the researcher reflects on their own positionality and how it influences their research. By acknowledging the researcher's own biases and subjectivity, autoethnography aims to produce a more transparent and honest account of the research experience.

Another important feature of autoethnography is its use of personal narrative. Autoethnography is often based on personal stories, which can be used to explore broader social and cultural issues. These stories are not only used to illustrate the researcher's own experiences, but also to shed light on the experiences of others who share similar backgrounds.

Critics of autoethnography argue that it is too subjective and lacks scientific rigor. They also argue that the use of personal narrative can be seen as narcissistic and self-indulgent (Stephens-Griffin and Griffin, 2019). However,

proponents of autoethnography argue that the use of personal narrative allows for a more nuanced understanding of complex social and cultural issues (Allen-Collinson, 2012), and that reflexivity and transparency can mitigate concerns about subjectivity.

Autoethnography has been used in various research settings, namely in business research, particularly in the fields of management (Sambrook, 2021), organizational studies (Doloriert and Sambrook, 2012), and entrepreneurship (Fletcher, 2011). One of the key contributions of autoethnography in business research is its ability to provide an insider's perspective on organizational culture, decision-making processes, and leadership styles.

Although, autoethnography has not been much applied in the field of happiness studies, which explores the factors that contribute to well-being and life satisfaction. In this sense, the present paper aims to bring a new perspective in this field, by exploring how cultural, social, and personal factors shape individual definitions and experiences of happiness through the researcher's personal experiences.

The pursuit of happiness (often spurned by a certain dissatisfaction with the *status quo*) is a fundamental human goal that has been studied by philosophers, theologians, and scientists for centuries. Despite its universal importance, the definition and means of achieving happiness vary greatly across cultures and individual experiences (Uchida, Norasakkunkit and Kitayama, 2004). For example, some cultures may place a higher value on material wealth and success, while others may prioritize spiritual fulfilment or strong relationships. Additionally, cultural norms and expectations can also impact what people consider to be the sources of happiness in their lives (Joshanloo and Weijers, 2014).

In the pursuit of happiness, researchers have long debated its definition and how to achieve it. Bochner (2012) argues that happiness cannot be understood without considering its ties to narrative and moral judgments about the goodness of life. This understanding of happiness suggests that autoethnography, a qualitative research method that explores personal experiences and cultural context, could be a valuable approach for happiness studies.

In this autoethnographic paper, I reflect on my own journey towards happiness during a year-long travel across 22 countries within southern Africa, southeast Asia, and South America, focusing on the first part of the trip - southern Africa.

Through the use of personal narrative and cultural analysis, I delve into the ways in which my own cultural background and societal expectations shaped my understanding of happiness. I also explore the ways in which immersing myself in a new culture and community impacted my pursuit of happiness and well-being. By reflecting on my own experiences and observations, I aim to shed light on the complexities of the pursuit of happiness and the potential for personal and cultural growth that can result from stepping outside of one's comfort zone.

Through this autoethnographic lens, I hope to offer a unique and personal perspective on the pursuit of happiness, and to encourage readers to consider the cultural and individual factors that influence their own pursuit of this universal goal.

This essay is an autoethnographic exploration of the pursuit of happiness and its connection business and economics. I reflect on the cultural and individual factors that influence our quest for happiness, highlighting the idea that, despite the importance of material things, they may not necessarily bring happiness. This essay also raises questions about our motivations for work and the role of wealth in achieving happiness. Ultimately, the essay is a call for reflection on what truly matters in life.

In the following section I present four different autoethnographic narratives, before presenting the final conclusions.

2. Autoethnographic narratives

2.1 Story 1: A brief introduction to my own pursuit of happiness

I used to work as a dentist in France after studying in Portugal. I decided to move abroad because job opportunities in Portugal were scarce and poorly paid. I chose France because there is a high demand for dentists, and they are well respected (and well paid) in the country.

While I was studying to become a dentist, I understood that I couldn't be doing that for the rest of my life, but I was already there, and I didn't want to disappoint my parents, so I kept going. I was a good student and became a good dentist. But I didn't love my job. Actually, I didn't like it at all. It made me anxious, caused back pain, and the more I worked, the less I enjoyed it.

I began to consider other options... Society often frowns upon those who leave their careers. But society is more concerned with status, consumerism, and economic growth, than with personal happiness. It can be difficult to break free from these expectations and leave a job without feeling like others are judging you. How can one escape this trap and pursue their own happiness without feeling like a failure in the eyes of society?

In my culture, the Portuguese culture, I felt that I needed to prove my value, and that I was only worth if I had a proper well-paid job, and with a good status. Had it always been like this alongside history? Is this the feeling in other cultures? I didn't think so. I needed more than the "rat race". I needed more than a high paying job. After four years and a half in France, an experience that I don't regret at all, I decided to quit! Six months after quitting I moved back to Portugal, to depart again after one month, for my dream trip! The plan was travelling for a year, clean my mind, broad my vision of society, and maybe get some answers, or even more questions!

It was the second-best decision that I took in my life (the first one was marrying my husband)! What a travel!!! We started in Kenya, did all the southern African countries, then Southeast Asia, and at last, South America. After one year of travels, my mind was not clearer, but I learned so much, that I still cannot put it into words. I felt totally free, and that I could do whatever I wished. Living as a traveler is liberating!

I feel that I have gained more memories from that sole year, than the rest of my life, but that's another story. Here, I want to focus in my pursuit of happiness. How can someone have everything and not be happy, and how can someone have nothing and be happy? It seems like a paradox, but it is not. The question is: "what is everything"? If our sole focus is on acquiring material possessions, then our lives will be filled with unhappiness. That is why I saw so much joy in countries, such as Quenia and Malawi where the vast majority of the population lived very poorly!

2.2 Story 2: The first safari

I must state that I have a special feeling about Africa. I don't know if it is because my mother was born in Mozambique, or because Africa is the birthplace of *homo sapiens*, or even maybe because I found that it is the most untouched continent of all the continents that I've visited. I started the African journey in Kenya's frenetic capital: Nairobi, which has a population of over 5 million. It is a cultural shock, to say the least, and despite the chaos of the city, people are generally nice. But we wanted to see the natural parks, and the wildlife, so we hurried to book our first safari, at the Masai Mara National Reserve.

Going on a safari in Africa, besides being a unique and unforgettable adventure, is also a way to remember childhood and see "The Lion King" come to life. There is no music more fitting for a safari than "The Lion Sleeps Tonight". When the first chords start playing, everyone gets ready to sing along!

Going on a safari means realizing that Simba, the cute little lion who made us cry as children, means "lion" in Swahili, and that Rafiki means friend. Learning that "Hakuna Matata" really means "no worries." In Africa, I felt that that was really the motto. We bring a thousand and one problems from our Western lives, and we realize that, after all, "hakuna matata". The rhythm in Africa is different. It is really about living in the moment, looking at the landscape, and marveling at nature.

Going on a safari means spotting a group of warthogs and our guide saying, "There's Pumbaa!" and everyone looking delighted at those comical animals, and what came to my mind was Pumbaa eating insects clinging to the underside of a rock. And then realizing that the guide had never seen "The Lion King" but already knew the names of the characters just by hearing tourists talking about them during safaris.



Figure 1 - Two Warthogs in Masai Mara National Reserve. The photo was taken by the first author.

Seeing all the wild animals on the savanna, makes us realize that nature is truly perfect. There is something for everyone, from the smallest herbivores to the largest carnivores. And that makes us understand even better why we need to take good care of our planet.

While we were in the Masai National Reserve we visited a Masai village (*Figure 2*). People there live very simply, they rely on cattle for their subsistence, and their houses are traditional, made with clay and straw. Surprisingly, they have access to cellphones, that they charge with one small solar panel. The Masai showed their houses, their traditional way of life, and we could see the happiness on their faces. Although the living conditions of these people are much worse than ours, compared to the standards of developed countries, they are happy, welcoming people who smile and wave at strangers. It is interesting how one can live so simply and yet be happy.



Figure 2 - The Masai making fire in the traditional way. The photo was taken by the first author.

And all of this makes me think about what is really important. It makes me think that priorities are upside down in the western culture. We are all like little sheep running back and forth without being able to stop for a moment, always thinking about our own problems. We are living far above the possibilities of our planet, and we know that this is making it sick. We continue to walk blindly down a path that is often empty, doing jobs that do not excite us, and forgetting to enjoy the moment.

We need to know how to say "Hakuna Matata"!

We need to look more at what is happening around.

We need to look inside ourselves to find out our purpose. What we want to leave in the world.

We need to stop looking at clocks and bank accounts.

That's why I love traveling so much. Because I am amazed by what I have around me and because I see other cultures. Because all of this makes me stop in time. It makes me question. It makes me think.

So, you, who are reading this text, stop for a moment and think about how lucky you are. "Hakuna Matata!"



Figure 3 - The Masai Mara National Reserve and its iconic acacia tree. The photo was taken by the first author.

2.3 Story 3: Travelling in southern Africa

After this first safari experience, we departed from Nairobi to one of the most thrilling experiences of the whole trip: an overland tour, which means travelling by land, in a truck (*Figure 4*), with a group of adventurous people, from everywhere around the globe. We were around 20 travelers, plus one cook, one driver and one guide. Each time we arrived in one place, we needed to put the tent up, unpack our things, and in the next morning, pack everything again in the truck. It was tiring but allowed me to be in touch with many different African cultures and see the beauty of African nature.



Figure 4 - Our overland truck in Namibia. The photo was taken by the author.

After Kenya, we went to Tanzania, Malawi, Zambia, Zimbabwe, Botswana, Namibia, South Africa, where we said goodbye to our overland group and started travelling on our own and did all the south African coast from Cape Town until Durban, and then followed to Mozambique, our last destination in Africa.

During this trip we encountered various humanitarian issues that affected the happiness and well-being of the people we met. For example, in Malawi, one of the poorest countries in the world, we visited a school where 11 teachers were responsible for educating around 1500 students. It was shocking to witness the lack of access to education and resources that children face in these regions, preventing them from reaching their full potential and pursuing their own happiness. The mandatory costs of uniforms and materials for school attendance also served as barriers for many families.

Despite these challenges, the resilience and positivity of the people we encountered was inspiring. Even in the face of extreme poverty, they maintained their smiles and hope for a better future. For too many, life is made with less than one dollar a day. And that made me feel sad because I know that we could live in a much more equal, fairer, and peaceful world.

I've found that, in general, people in Africa live exclusively in the moment. They cannot think long term, because they don't know if they will have their basic needs met tomorrow. So, they only focus on the now, and that is what I felt during the whole year of travels: I was most happy when I was only in the present, and travelling allows us this joy. This may seem very obvious and simple, but it is everything except that. Being in perfect harmony with the 'now' is so difficult! Even more, when we live in a stressed society, attached to high-speed technology, that puts us away from the moment.

2.4 Story 3 – My message to Africa

Africa, for three months I traveled your golden and warm body. By truck, by boat, by car, and on foot. You left me in love!

Africa, don't try to be something you're not. Don't try to become the consumerist society where I come from, where everyone looks out for themselves.

In you, I found a connection to nature.

Some people call you names. Where I come from, they say you're underdeveloped, poor, and full of misery. But I say, you hold the greatest riches within you.

Preserve yourself as you are.

Please don't change.

Your people live on your scorching land in their own way, at their own pace. They are simple people who still live in communion with nature and still look out for others around them.

I wonder about the marks that your colonizers, including my ancestors, left on you. The wounds that are still not healed.

Maybe I am speaking in an unfair tone to those who were born in your body. But I just wish that none of that would change because what I saw was the greatest wealth that my eyes have ever glimpsed.

Seeing the wildlife in Massai Mara, Ngorongoro and Serengeti, South Luangwa, Chobe, Etosha, navigating the Okavango Delta by mokoro, seeing the beaches of Zanzibar, seeing and feeling the impressive Victoria Falls, climbing the dunes in the Namib Desert, descending Table Mountain, sighting majestic whales off the coast of Hermanus, diving in Mozambique and being amazed by the colors of those fish and that sea... and so much more made me happy and made me feel alive, grateful and blessed.

I hope your people can live better, but don't let them lose the roots of their ethnic cultures or their connection to nature. Don't let them lose the smile on their faces.

This is Africa. A sunset beyond words. A night under a starry sky as far as the eye can see on the savannah. The calm of a delta intercut with vegetation. A hot afternoon looking for your greatest riches: giraffes, wildebeests, lions, hippos, zebras, buffalos, crocodiles, impalas... Looking at the silence of the savannah and believing that anything is possible. Seeing the beauty all around us.

Thank you for letting me come to you!

Don't change, Africa!

3. Conclusion

Traveling can be a great source of inspiration and can help stimulate creativity and innovation. When we travel, we are exposed to new cultures, ways of life, and ways of thinking that can challenge our preconceptions and broaden our perspectives. This can help to spark new ideas and inspire us to think creatively. Additionally, travel can provide the opportunity to try new things and take risks, which can also foster creativity and innovation.

One reason that travel may enhance creativity is that it allows us to take a break from our daily routines and habits. This can give our brains a chance to rest and recharge, which can make us more open to new ideas and more likely to think outside the box. Travel can also expose us to new environments, which can help to stimulate our senses and inspire new thoughts and ideas.

Overall, travel can be a powerful tool for fostering creativity and innovation. It allows us to step outside of our comfort zones, learn from different cultures, and be open to new experiences, all of which can help to stimulate our creativity and inspire new ideas.

This travel experience changed me and allowed me to confirm my suspicions that happiness only happens in the now. Happiness is not something that you pursue, it is something that you feel in the present, without being afraid of what can happen in the future! So, in my opinion, cultures that know how to appreciate the present moment, in the same conditions, are happier cultures.

Many people assume that the accumulation of material wealth, access to the latest technology and advancements in innovation will lead to a happier and more fulfilling life. However, I've found that these external factors do not necessarily lead to happiness. While they may bring temporary pleasure and satisfaction, they do not provide a lasting sense of joy or contentment. In fact, excessive materialism and the constant pursuit of more can actually increase feelings of stress, anxiety, and dissatisfaction. Happiness is a state of mind that is not dependent on external factors, but rather, it stems from within. A sense of purpose, meaningful relationships, and self-awareness are more important components of happiness than wealth, technology, or innovation.

Autoethnography can offer a unique and valuable approach to studying happiness, as it recognizes the subjective nature of the experience. Through sharing personal narratives and experiences, the author contributes to the literature by providing a rich and nuanced understanding of happiness that is grounded in lived experiences. By acknowledging the importance of individual perspectives and subjective experiences, autoethnography can shed light on the complex and multifaceted nature of happiness, offering insights that are often overlooked in more traditional research methods. Thus, this paper highlights the potential of autoethnography as a valid methodology in happiness studies, paving the way for further exploration of this approach in the field.

On the other hand, in the context of business and management, the importance of happiness cannot be overstated. In particular, the positive inner work life principle or effect [one's positive psychological experience when at work] states that happier, more fulfilled, more intrinsically motivated (Amabile, 1998) individuals are more creative, and even make better colleagues, which in turn makes for a better work environment – so everyone benefits (Amabile, 2017). Especially if the work is seen to be worthwhile and *meaningful*.

Perhaps, in the post-Taylorism period, the greatest challenge is to make work meaningful and to set as an objective to leave room for creativity in daily work tasks... Intensely positive emotions are very good for the organization and for the collaborators involved. It is healthy for all. To deny this is to turn one's back on a reality that award-winning psychologists such as Tversky, Kahneman and Thaler proved to be true – that human beings are highly emotional in everything they do, as opposed to the *homo economicus* view of society – which portrays us as colder, more profit-maximizing decisionmakers – when in fact we are not.

To deny happiness and happy feelings in the workplace is to deny human potential and its essential place in everyday work life. Our research described herein states further that staying in the now [the present] leads to the greatest sense of happiness, and that work should not be too future / goal-oriented or money-oriented but rather creativity-oriented and oriented towards the satisfaction of employees.

In conclusion, the integration of this study with autoethnography theory is natural and seamless. In line with the principles of autoethnography, the author becomes both the subject and researcher, rendering a personal account of happiness rooted in self-reflection and introspection. This study reaffirms the value of personal narratives and experiential knowledge in contributing to broader academic discourses. In particular, the author's traveling experience serves as a lived cultural encounter, where the self becomes a site of learning and data generation, providing a rich, in-depth understanding of the concept of happiness that transcends surface-level interpretations. In this way, autoethnography not only serves as a means to examine happiness in the context of travel and work but also enables the reframing of theoretical understandings and practical applications of happiness in everyday life and organizational settings.

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References

- Allen-Collinson, J. (2012) 'Autoethnography: Situating personal sporting narratives in socio-cultural contexts', in *Qualitative research on sport and physical culture*. Emerald Group Publishing Limited.
- Amabile, T. M. (1998) *How to kill creativity*. Harvard Business School Publishing Boston, MA.
- Amabile, T. M. (2017) *Creativity and motivation*. Available at: <https://tinyurl.com/3ucbyrrj> (Accessed: 29 March 2023).
- Bochner, A. P. (2012) 'Suffering happiness: On autoethnography's ethical calling', *Qualitative Communication Research*, 1(2), pp. 209–229.
- Bunyan, E. (2021) 'Can I Tell You My Story? The Story Beyond the Stories: An Exploration into The Use and Value of Autoethnography Within Cross-Cultural Qualitative Research in Uganda, A Postcolonial Approach', *International Journal of Arts, Humanities and Social Science*, 2(07), pp. 12–25.
- Doloriert, C. and Sambrook, S. (2012) 'Organisational autoethnography', *Journal of Organizational Ethnography*.
- Fletcher, D. E. (2011) 'A curiosity for contexts: Entrepreneurship, enactive research and autoethnography', *Entrepreneurship and Regional Development*, 23(1–2), pp. 65–76.
- Gant, V. et al. (2019) 'Social work through collaborative autoethnography', *Social Work Education*, 38(6), pp. 707–720.
- Hamilton, M. L., Smith, L. and Worthington, K. (2008) 'Fitting the methodology with the research: An exploration of narrative, self-study and auto-ethnography', *Studying teacher education*, 4(1), pp. 17–28.
- Joshanloo, M. and Weijers, D. (2014) 'Aversion to happiness across cultures: A review of where and why people are averse to happiness', *Journal of happiness studies*, 15, pp. 717–735.
- Poulos, C. N. (2021) 'Conceptual foundations of autoethnography.', *Essentials of autoethnography.*, pp. 3–17. doi: 10.1037/0000222-001.
- Sambrook, S. (2021) 'Management education through autoethnography', *Human Resource Development International*, 24(3), pp. 244–261.
- Stephens-Griffin, N. and Griffin, N. (2019) 'A millennial methodology? Autoethnographic research in do-it-yourself (DIY) punk and activist communities', in *Forum: qualitative social research*. Institute for Qualitative Research, p. 3.
- Uchida, Y., Norasakkunkit, V. and Kitayama, S. (2004) 'Cultural constructions of happiness: theory and empirical evidence', *Journal of happiness studies*, 5(3), pp. 223–239.

A Data-Driven Approach to Teaching Research Methods: *iMethod*, a Proof-of-Concept

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Abstract: Courses in research methods play a critical role in postgraduate education. However, postgraduate students face considerable challenges in learning the subject matter. The present paper introduces *iMethod*, a software application designed to track students' engagement with the content of research methods courses. *iMethod* harvested data, analysed students' engagement, and presented the outcome to a teacher through a dashboard rendered in real-time. As a proof-of-concept, a usability study on *iMethod* was conducted with a sample of postgraduate students and early career academics (n=37) at a research-intensive university in New Zealand. Key findings suggest that students and academic staff found *iMethod* a valuable application for enhancing research methods learning. In particular, students value its content for understanding fundamental concepts while valuing its inquiry facilitation and providing helpful information on research methods. Participants said *iMethod* could expand knowledge, offers guidance, and the content is accessible to a diverse range of students. Lastly, participants reported that *iMethod* facilitated easy knowledge sharing, and the interface design was user-friendly and intuitive. The paper contributes to the growing need to promote research into the curriculum design of research methodology programmes and the quality of teaching research methods courses.

Keywords: Research Methodology, Learning Analytics, Visualisation, *iMethod*

1. Introduction

Research methodology is a foundational subject in postgraduate education, playing a critical role across various disciplinary contexts. It involves employing systematic approaches and procedures to investigate well-defined problems (Daniel & Sam, 2011). However, teaching research methodology or methods is challenging due to students' diverse backgrounds, prior knowledge, interests, and expectations (Earley, 2014; Kilburn, Nind & Wiles, 2014; Saeed & Al Qunayeer, 2021). The varied backgrounds of students and the pedagogical content knowledge and experience of teachers make teaching and learning this subject highly demanding.

This paper introduces *iMethod*, an online platform I developed in 2018 to track, gather, and visualise learning analytics related to students' engagement with content in the research methodology courses. *iMethod* allows teachers better to understand students' engagement patterns in online learning, tracking their progress and identifying specific challenges they may face with the course content. It presents a visualisation dashboard to research methods instructors, enabling them to observe how students interact with the content. With *iMethod*, teachers can analyse and gauge the correlation between the amount of time students spend viewing a piece of content and the difficulty level of a piece of content. Such information can be used to redesign learning materials or appropriately support students.

2. Related literature

Research methods learning is an integral part of postgraduate education. However, research indicates that research methods courses' learning outcomes are poorer than other subjects (Daniel, 2019; Earley, 2007; Lehti and Lehtinen, 2005; Murtonen, 2015). Students learning research methods face several challenges, including a mismatch between the content design and the expected learning outcomes, difficulty connecting theoretical constructs to practical aspects such as data analysis, becoming competent in data analysis and statistics, and engaging critically with literature. Some students associate quantitative methods with mathematical and statistical knowledge, leading to numerical anxiety and avoidance of the subject.

Additionally, framing the right research questions and responding to conflicting views and directions from multiple supervisors can be challenging for students (Daniel, Kumar & Omar, 2018). Research suggests that teaching research methods to meet diverse expectations is challenging due to the increasing diversity of students pursuing postgraduate education (Teddlie & Tashakkori, 2009). Research methods can be complex for some students to comprehend, and the time available for teaching is often inadequate (Benson & Blackman,

2003; Daniel, 2017). Given the complexity of teaching and learning research methods, it is crucial to research the pedagogy of research methods to improve learning outcomes (Kilburn, Nind & Wiles, 2014).

3. Data-driven educational research

For several years, research into students' learning outcomes associated with research methods has depended on self-reported data. While providing valuable insights, surveys and interviews are unlikely to provide authentic information about students' behaviour and how they engage with learning materials on research methods. I proposed a dual pedagogical research approach involving the combination of self-reported student surveys and learning analytics research. Learning analytics can capture various data and provide insights to enable users to make informed decisions (Susnjak, Ramaswami & Mathrani, 2022). By combining self-reported data (questionnaires and student evaluation forms) and learning analytics, teachers of research methods can examine students' perceptions of the quality of the learning and how they experience the teaching process and gain some insights into students' authentic behavioural patterns in a course.

The growing interest in data-driven instruction is evidence of the potential of utilising data to understand complex learning problems (Howard et al., 2022). When teachers use student-generated data, they will respond to learning problems effectively. Data-informed teaching practice allows teachers to collect, analyse and use data to shape their teaching and learning processes. This would also enable them to reflect and improve their teaching by utilising information collected from the learning environment, students and their learning processes (Ndukwe & Daniel, 2020). For example, while the student experience survey allows students to share their experiences and opinions on how research methods should be taught or to reflect on their learning, capturing student learning activities through examining how students engage with learning materials can better inform the identification of valuable pedagogical intervention.

4. Learning analytics

The learning analytics approach utilises computational tools to explore how students engage with content and the learning process to gain valuable insights for improving learning (Daniel, 2019; Gašević, Dawson & Siemens, 2015; Kaliisa & Dolonen, 2022). Analytics enable instructors to track and understand student engagement with the content of courses, understand their teaching approaches and develop appropriate pedagogical interventions to support students learning (AlZoubi, 2022; Bañeres & Serra, 2018; Ndukwe & Daniel, 2020).

Learning analytics provide teachers with insights they can use to develop a better quality of content, improve student learning activities, and provide real-time personalised feedback to students (Amigud et al., 2018; Jivet & Drachsler, 2022). Results of learning analytics are presented to instructors and students in the form of visualisation dashboards. Dashboards enable teachers and students to visualise learning activities and promote awareness, reflection, and sensemaking (Park & Jo, 2015; Susnjak, Ramaswami & Mathrani, 2022).

The personalisation of learning afforded by analytics through dashboards is critical to inexperienced learners interested in understanding their progress in a course and against others in the class (Wise, 2014); personal benchmarking against others will likely help students gain self-efficacy, self-awareness, and motivation. Looking at behavioural activities generated in the students' dashboards, teachers can learn how, where and when students engage with learning online or in blended mode; the data can also be used to inform the learning design in the face-to-face classroom. Research shows that student dashboards can encourage conversation between teachers and students about their progress (Smith, 2019).

The dashboard in *iMethod* draws from the idea of early learning analytics dashboards for instructors presented in the signal system (Arnold & Pistilli, 2012). The signal systems use data collected from online learning environments to identify students who might risk failing a paper or programme of study. The signal system captures the student's learning activities and predicts learning outcomes based on three indicators: grades on the course, time spent on a task, and past and present performance (Arnold & Pistilli, 2012; Jayaprakash et al., 2014). The prediction is carried out in real-time or near real-time based on data collected from the student's engagement with content (readings, assignment performance, etc.).

The student dashboard serves as a mirror for the instructors to reflect on their teaching impact on students and make necessary changes to the pedagogy. For example, by analysing students' access patterns, particularly the time spent viewing a piece of content, the instructor of research methods can revise the information contained in a particular learning object or resource to benefit students. For instance, revisiting a resource several times suggests that the content is necessary, interesting, or challenging to comprehend.

On the other hand, *iMethod* presents students with their learning analytics dashboard. Students use dashboards to understand their learning trajectories and possibly take control of their learning performance in real-time—examples of student visualisation dashboards present dashboards that visualise self-assessment exercises (Mazza & Dimitrova, 2007). In *iMethod*, the student dashboard enables the student to reflect on and manage their learning, and at the same time, they can use data from the dashboard to identify areas where they face challenges and need support. For instance, the student activity meter (SAM) tracks and visualises course progress for students and teachers (Govaerts et al., 2012). Students can monitor their progress in the course and, by comparing their progress to peers, dashboards can improve students' motivation and incentivise change in study behaviours (Smith, 2019).

5. Overview of the *iMethod* Digital Learning Environment

I developed *iMethod*, a digital learning environment, to support teaching research methods courses and for students to access learning materials in place. Unlike other virtual learning environments, *iMethod* was intended as a hub for collecting analytics associated with students' engagement with learning materials rather than a full learning management system. The environment provides sound bites and just-in-time research methods advice to postgraduate students and early career academics. The feedback is provided to system users in various forms (e.g. text, video and audio). Figure 1 provides a view of the main interface.

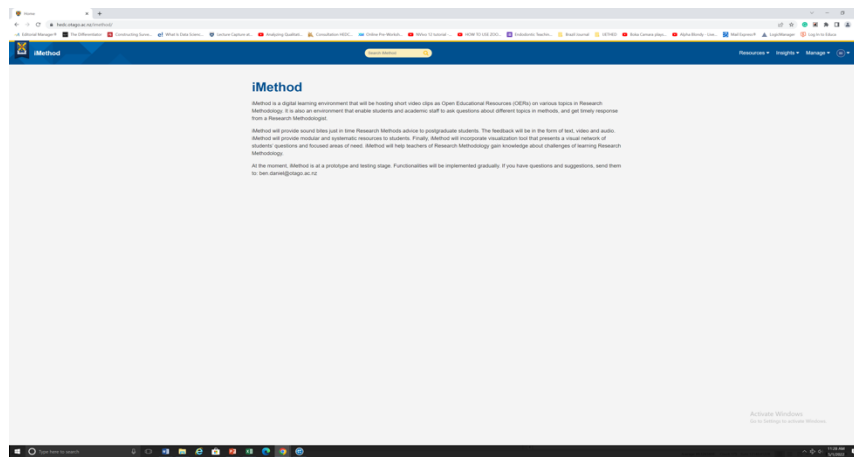


Figure 1: The main interface

In order to help teachers gain knowledge of the challenges of learning research methodology/research method and propose strategies and models of teaching the subject matter, the environment is designed in a modular and systematic structure, and it incorporates a tool that presents a visual network of students' questions. *iMethod* Proof-of-Concept (PoC) captures engagement analytics and presents visualisation dashboards for students and teachers. The core components of the prototype are presented in Figure 2.

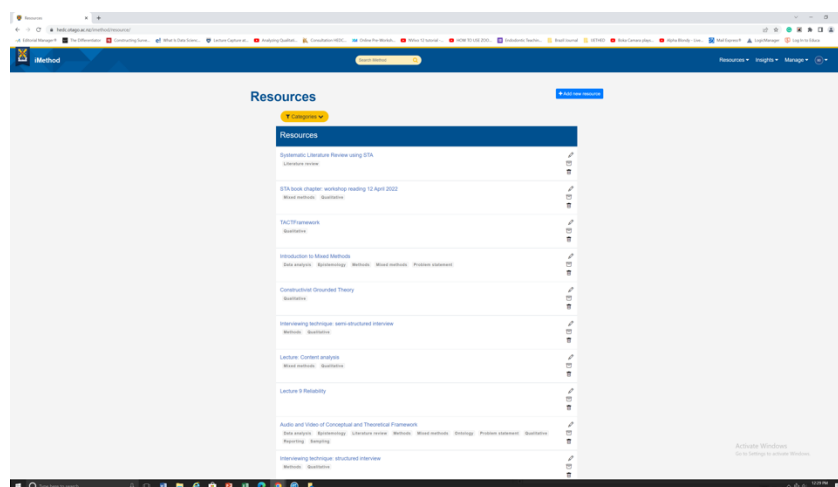


Figure 2: Example of the resources page

6. Behavioural analytics and teacher's dashboard

iMethods captures and presents behavioural learning analytics. This form of data analytics focuses on capturing actions of students' engagement with content and the overall time they spent interacting with the system. Information presented in the dashboard enables the instructor to gain insights into how students engage with content and use that information to improve the quality of teaching. Figure 3 illustrates students' interaction with learning materials, including total and unique views. This data helps educators evaluate engagement and understand individual or group difficulties with specific content. For instance, the "Introduction to Mixed Methods" had 14 views, including 4 repeat viewers, indicating specific access patterns that may require content resequencing or the instructor's attention. Teachers can also examine individual viewing patterns via the dashboard. Table 1 and Figure 4 further detail the time spent on different resources, providing insights into average and maximum engagement durations.

Table 1: Resources with time users spent engaging with each resource

Resource	Min	Median	Average	Max
Analysing your interviews	6	18	412	1607
Interviewing technique: semi-structured interview	2	8	202.75	793
Introduction to epistemology	3	4	135.8	646
Interviewing technique: structured interview	2	4	64	247
Conceptual and theoretical framework	10	43	51.6	125
Interviewing technique: Open	2	3	37	106
Theory and tools	14	24	39	95
What is Triangulation (Qualitative research)	3	10	21.5	81
Systematic literature review using STA	5	10	22.4	65
Introduction to mixed methods	3	11	16.57143	46
Lecture: methods	3	12	20.333333	46
TACT framework	3	17	20.66667	42
Lecture: Content analysis	3	19	19.4	41
Survey Design for Science and Communication	14	24	24	34
Evaluating qualitative research: Scientific rigour	4	9	12.16667	33
Overview of experiments	11	22	22	33
Reliability and validity	2	17	17	32
Constructivist Grounded theory	3	6	9.090909	30
Survey research design	24	24	24	24
Ontology, epistemology and methodology	3	8	9.75	20
Reliability techniques	3	10	10	17
Mixed methods research--definition	3	5	6.75	15
Framing a qualitative research study	7	11	10.5	14
The STA book chapter	3	5	6.727273	12
What is ontology?	3	3	6	12
Qualitative data analysis: A step-by-step guide	10	10	10	10
Understanding a conceptual and theoretical framework	4	5	5.2	8
What methodology should I use?	5	6	6	7
Ontology, epistemology and methodology	5	5	5	5
Qualitative research questions	5	5	5	5
Research hypothesis and variables	3	4	4	5
Theoretical and conceptual frameworks	4	5	4.5	5
Introduction to Validity	3	3	3	3
Total	178	367	1263.706	4264

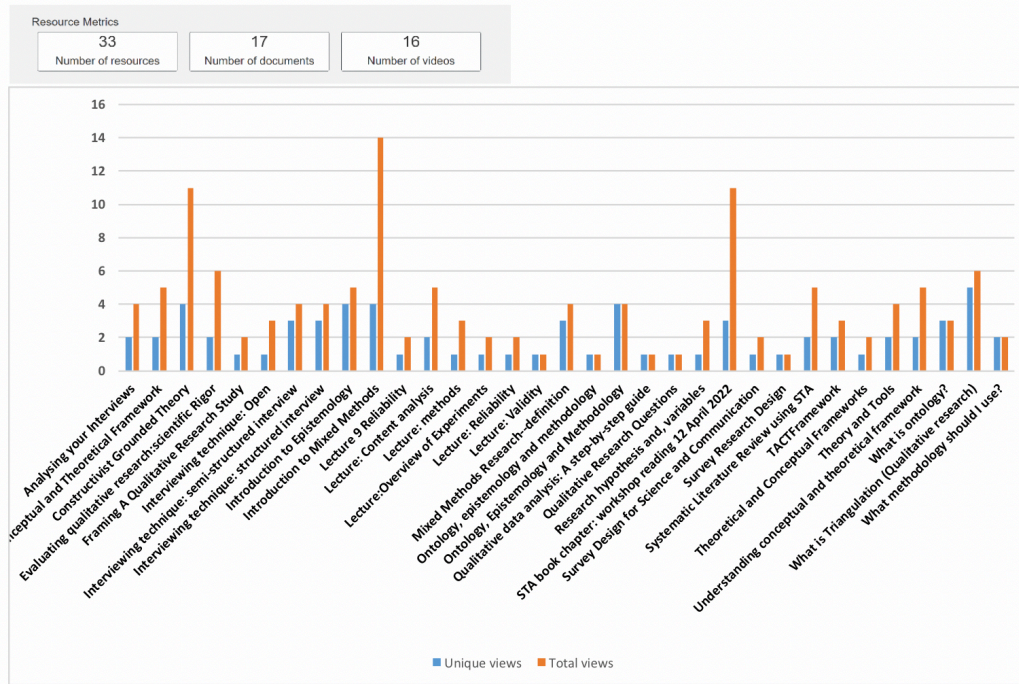


Figure 3: User engagement analytics

iMethod records the duration student spends on each resource, creating attention metadata! (Table 1) that help teachers to provide targeted support to students. Attention metadata! in iMethod, an approach that describes data gathered about a student's focus within a digital platform. This can encompass details such as a student's duration with certain screen elements and content, the items they select, and the sequence of accessed materials. The analysis of attention metadata! helps the instructor gain an invaluable understanding of students learning behaviours, which can be used to inform the instructional design of learning materials that enhance the learning experience.

Maiorana Cszmadia and Richards(2021) noted that attention metadata! enables instructors to track content interactions and identify where students dedicate most of their time. This helps tailor the necessary learning support. Table 1 shows students' engagement durations for various research resources, and Figure 4 displays the average and peak times spent with these resources.

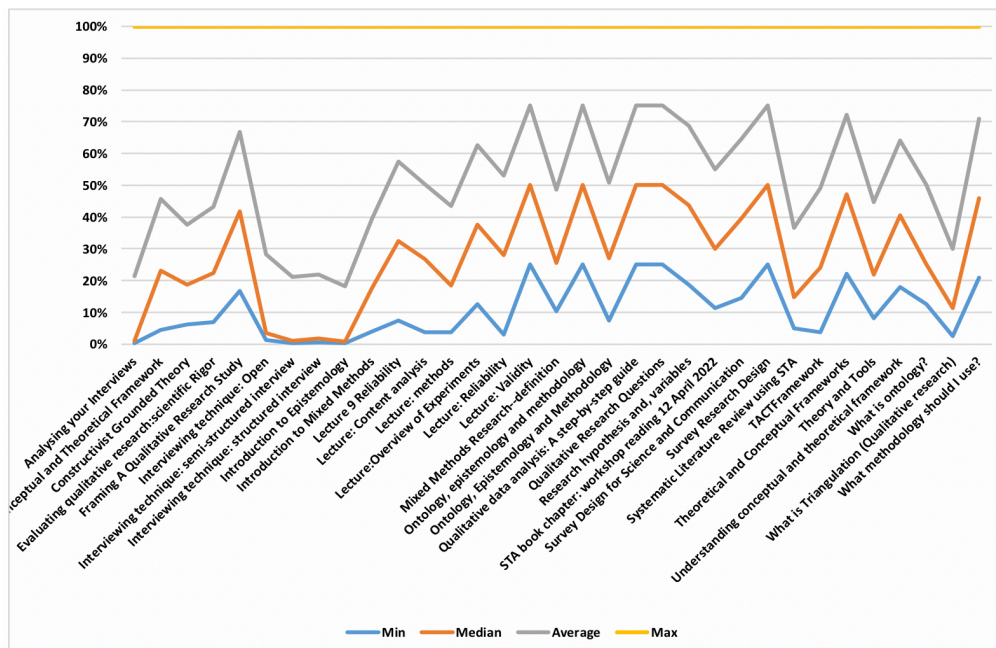


Figure 4: Average and maximum time spent on engaging with resources

Figure 5 illustrates the correlations between access and views of different resources; the darkness of the line signifies the strength of the association between them. For example, a darker line would appear between the two resources if user **A** views resource '**r**' and then views resource '**q**' within a specific time '**t**'. This correlation implies that these two resources are often accessed or viewed in tandem, possibly because they are related in content or theme or because one resource naturally leads to the other in the progression of the course material. This information is invaluable for the instructor as it allows them to map out a network of resource access among students, potentially unveiling learning behaviour patterns. By analysing these associations, the instructor can better understand how different resources are interconnected in the students' learning process. This can inform the structuring of the course content, ensure that related resources are appropriately linked, and even identify potentially confusing or difficult areas in the coursework.

Moreover, these correlations could help identify resources that consistently appear in close proximity, suggesting a possible relationship in the difficulty level. If a particular resource is viewed right after another, it could imply that the second resource is a more complex extension of the first or that students find it challenging to comprehend. Armed with this information, the instructor could revise the course material or offer additional support to ensure better student understanding and engagement.

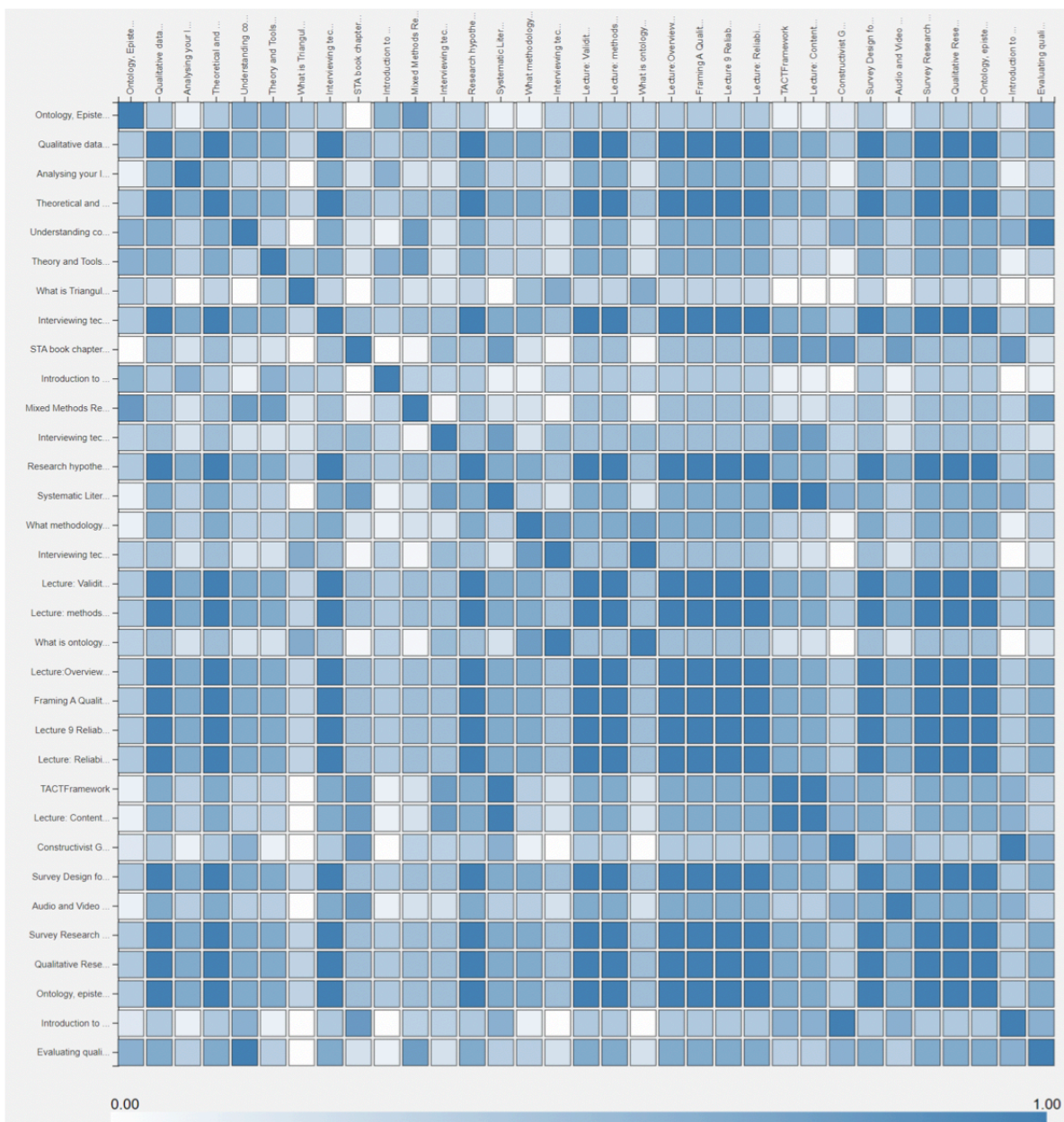


Figure 5: Resources viewing correlation matrix patterns

7. The usability and user experiment

To test the usability of the software, user experience and the value of *iMethod* in supporting student learning, I developed an online questionnaire consisting of 8 items. The assessment items were measured on a Likert scale and were administered to postgraduate students and academic staff who had engaged with *iMethod*. The assessment items consisted of questions intended to learn about the learner's experience and the extent to which the analytics dashboard built into *iMethod* contributed to student learning—other assessment items examined learners' engagement with the various content provided in *iMethod*. In addition, users were asked whether accessing *iMethod* improved their learning experience.

7.1 Methods and procedures

The experiment carried out engaged a convenience sample to enable us to collect data from students and academic staff. Participants (n=37) were volunteers who participated in a series of workshops on research methods and interacted with *iMethod*. Participants were self-selected—a non-representative sample recruited from students and academic staff in the institution where the research was conducted. They identified as PhD students (21, 57%), Master's students (5, 13%) and academic staff (11, 30%). They came from various subject domains, including Sciences (8, 21.6%); Health Sciences (6, 16.2%); Commerce (3, 8.1%); Interdisciplinary (3, 8.1%) and Humanities (17, 45.9%). Data from the closed-ended questions were summarised using sample statistics (frequencies and proportions Table 2). Data obtained through the open-ended questions were thematically analysed.

8. Results

The overall usability and user experience results suggest that both students and academic staff found *iMethod* helpful in supporting the learning of research methods. Students, in particular, reported that the content provided in *iMethod* helped them better to understand the fundamental concepts of research methodology. One participant said: "*iMethod* is an excellent opportunity for the users to find all up-to-date and suitable resources in one place." Others said the application enables them to ask questions and acquire helpful information to support their learning: "...users can share relevant queries and request more resources...."

Through *iMethod*, some participants said they were able to extend their understanding of research methods and consolidate their knowledge of the fundamental concepts.

"This is an institutional treasure. This is invaluable for consolidating and increasing my understanding of research methods. Consolidating what I know has allowed me to focus on areas I want or require a more detailed understanding."

Table 2 represents survey responses where participants have rated different aspects of their experience using *iMethod*. The ratings are based on a five-point Likert scale, often used in questionnaires to ask respondents about their level of agreement with a statement.

Table 2: Usability and user experience ratings

Statement	F(%) SA	F(%) A	F(%) N	F(%) DA	F(%) SD
The dashboard presentation increases my awareness of what content I must focus on.	17(45.9)	15(40.5)	2(7)	2(5.4)	2(5.4)
Access to the learning resources on <i>iMethod</i> helps me reflect on my learning.	25(67.6)	7(18.9)	0(0)	2(5.4)	3(8.1)
Overall, the content of the resources helped me better understand concepts in research	17(45.9)	15(40.5)	3(8.1)	1(2.7)	1(2.7)
After using <i>iMethod</i> , I sought additional materials or help with research methods.	17(45.9)	6(16.2)	10(27)	2(5.4)	2(5.4)
Overall, accessing materials on <i>iMethod</i> contributed to a better understanding of key concepts in research methods.	18(48.6)	15(40.5)	0(0)	2(5.4)	2(5.4)

F = frequency; SA = Strongly agree; A = Agree; N = Neutral; DA = Disagree; SD = Strongly disagree

From this data shown in Table 2, it can be concluded that most respondents had a positive experience with using *iMethod*, as the most considerable portion of responses for each statement were either "Strongly Agree" or "Agree". However, there is some variation in the responses, particularly in the statement about seeking additional materials or help, where 27% of respondents remained neutral.

8.1 Interactive dashboard for soliciting feedback

Participants found *iMethod* a valuable platform for seeking advice on research methods. One teacher commented, "*iMethod* allowed students to ask questions and obtain answers". Another one said that "*iMethod* provided students with the opportunity to reflect on their learning." A student said: "*iMethod* allowed me to ask questions directly and share knowledge." Another student indicated, "*iMethod* was best for reflecting on my learning by accessing my Dashboard, and the software is user-friendly."

Participants also mentioned that *iMethod* enriches the student learning experience and makes research methodology accessible to many students, as one student participant observed: "*iMethod* improved my learning experience. I love *iMethod*; it has made my study easier with resources provided there." *iMethod* also served as a helpful support platform, "*It is a useful platform for an audience who seek advice on research methods*". "*It is helpful because it has a discussion forum for students in different disciplines*."

Both students and teachers found *iMethod* convenient because it facilitates knowledge sharing and access to various resources on research methods.

"iMethod is a great platform for users to find all current and suitable resources in one place. The platform enables users can share relevant queries and request more resources!"

1. Scale usage to other courses in the programme

Participants said *iMethod* is a valuable learning resource and suggested that it be widely deployed in other subjects.

"iMethod is a valuable resource that needs to be deployed widely across courses. I used it only when studyingresearch courses. If they resolved to do so, it could similarly be used to easily upload material for other courses, such as for other courses. The research methods lecturer uploaded materials often for the course, which was a valuable course information source to us students."

Others remarked that... "*more courses should use this platform*." And that they found it helpful. "*It is beneficial and can be applied in difficult courses to make learning easier*."

8.1.1 Usability findings

Overall, participants found the design of the *iMethod* user-friendly, "*iMethod is user-friendly, an observation also echoed by a second participant: "user-friendly and easy to navigate through."*

"The interface is simple and loads fast." The simplicity of the presentation of the interface made it appealing to those who feel they are technologically challenged. "*Extremely practical to use even for a techno dinosaur like me.*" Some reported that the materials were well-organised and with a well-balanced structure. "*I thought the layout and the style make the software easily accessible. The folders on the homepage are well-arranged.*"

Participants also commented that it was easy to navigate. "*Entering iMethod only takes a few minutes to figure out how it is structured; it is straightforward.*" Those who described *iMethod* as user-friendly said, "*It is extremely user-friendly.*" In addition, one participant said that their experience was improved. "*User friendly with user experience enhanced.*" Others found it suitable for learning research methods and simple to use. "*Stable, convenient and user-friendly.*" One participant commented: "*At the moment, it seems simple. The dashboard is an interesting feature.*"

9. Conclusion and future directions

Research methodology plays a vital role in postgraduate education, but it remains a challenging subject to teach. This paper reports a data-driven approach to pedagogical research design to understand students' challenges in learning research methods. It draws from previous research on the challenges postgraduate students face in learning research methods and the difficulties teachers of research methods encounter when teaching the subject to diverse students. The paper presents *iMethod*, a software application designed and developed to track students' navigation and behavioural patterns, thus allowing teachers of research methods to collect, analyse, and visualise learning analytics that they can use to optimise teaching and provide better support to students.

The feedback from students and academic staff on the usability and user experience of *iMethod* highlights the application's significant contribution to research methods learning. Students, in particular, found the content available in *iMethod* highly valuable for understanding fundamental concepts and found the application's ability to facilitate inquiry and provide helpful information on research methods. Participants who took part in the usability and user experience study said *iMethod* served as a valuable tool for expanding knowledge and solidifying understanding, offering guidance and accessibility to a diverse range of students. Both students and teachers praised *iMethod*'s convenience, as it facilitated knowledge sharing and provided easy access to research method resources. The user-friendly design and intuitive interface were positively received by participants, emphasising its ease of navigation.

Data generated from the *iMethod* environment provides instructors of research methods courses with helpful information to understand students' specific challenges in learning research methods. For example, the outcome of the learning analytics led to various workshops with tools and templates to help students navigate the complexity of learning the content of the research methods course (Daniel, 2019). The design and deployment of an analytics and research methods workshops programme demonstrated the need to focus on curriculum interventions instead of learning analytics approaches focusing on only identifying at-risk students.

10. Limitations

As *iMethod* is currently deployed as a proof-of-concept in a beta version, data collected and used in the paper were limited to six months. As such, the observed learning analytics may not reveal stable patterns. In the future, it is necessary to broaden the software deployment to classes for both undergraduate and postgraduate students, extract longitudinal learning analytics, and develop student learners' models that can be used for personalisation and adaptive learning. In order to acquire an understanding of the vast-scale utility of the software and examine user experience, a large sample size will be required. Moreover, the usability and user experience sample is limited to 37 users.

References

- Amigud, A., Daradoumis, T., Arnedo-Moreno, J. and Guerrero-Roldan, A.E, 2018. A Procedural Learning and Institutional Analytics Framework. In: Caballé S., Conesa J. (eds) *Software Data Engineering for Network eLearning Environments*. Springer, Cham. *Lecture Notes on Data Engineering and Communications Technologies*, vol 11.
- Arnold, K. E. and Pistilli, M. D. 2012. Course signals at Purdue: Using learning analytics to increase student success in *Proceedings of the 2nd international conference on learning analytics and knowledge* (pp. 267-270), ACM.
- Al Zoubi, D. 2022. From Data to Actions: Unfolding Instructors' Sensemaking and Reflective Practice with Classroom Analytics. Companion Proceedings of the 12th International Conference on Learning Analytics & Knowledge LAK22: Learning Analytics for Transition, Disruption and Social Change, p.134-140. March 21-25, 2022, online.
- Bañeres, D. and Serra, M. 2018. Predictive Analytics: Another Vision of the Learning Process. In: Caballé, S. & Conesa, J. (eds) *Software Data Engineering for Network eLearning Environments. Lecture Notes on Data Engineering and Communications Technologies*, vol 11. Springer, Cham.
- Benson, A. and D. Blackman. 2003. "Can research methods ever be interesting?" *Active Learning in Higher Education*, 4(1),39–55. Doi:10.1177/1469787403004001004
- Daniel, B.K. 2019. Improving the pedagogy of research methodology through learning analytics. *Electronic Journal of Business Research Methods*, 17(1), 43-53.
- Daniel, B. K. 2017. *iMethod* and Learning Analytics Research Design for Pedagogical Enhancement of Research Methods Courses. *Proceedings of E-Learn: World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education* (pp. 769-777). Association for the Advancement of Computing in Education (AACE).
- Daniel, B.K., 2019. Using the TACT framework to learn the principles of rigour in qualitative research. *Electronic Journal of Business Research Methods*, 17(3), pp.118-129.
- Daniel, B., Kumar, V. and Omar, N. 2018. The postgraduate conception of research methodology: Implications for learning and teaching. *International Journal of Research & Method in Education*, 41(2), 220-236.
- Corrin, L. and de Barba, P. 2014. Exploring students' interpretation of feedback delivered through learning analytics dashboards. In *Proceedings of the ascilite 2014 conference* pp. 629-633.
- Daniel, P.S. and Sam, A.G., 2011. *Research methodology*. Gyan Publishing House.
- Earley, M. A. 2007. Lessons learned from students' research experiences [Editorial]—*Journal of Research Practice*, 3(1). Retrieved [January 11th 2015], from <http://jrp.icaap.org/index.php/jrp/article/view/93/75>
- Gašević, D., Dawson, S. and Siemens, G. 2015. Let's not forget: Learning analytics are about learning. *TechTrends*, 59(1), 64-71.
- Govaerts, S., Verbert, K., Duval, E. and Pardo, A. 2012. The student activity meter for awareness and self-reflection. In *CHI'12 Extended Abstracts on Human Factors in Computing Systems* pp. 869-884. ACM.

- Howard, S.K., Swist, T., Gasevic, D., Bartimote, K., Knight, S., Gulson, K., Apps, T., Pelocche, J., Hutchinson, N. and Selwyn, N., 2022. Educational data journeys: Where are we going, what are we taking and making for A.I.? *Computers and Education: Artificial Intelligence*, p.100073.
- Jayaprakash, S. M., Moody, E. W., Lauria, E. J., Regan, J. R. and Baron, J. D., 2014. Early alert of academically at-risk students: An open-source analytics initiative. *Journal of Learning Analytics*, 1(1), pp. 6-47.
- Jivet, I. and Drachsler, H. 2022. Springer Nature. Designing the Learning Analytics Cockpit-A Dashboard that Enables Interventions. In *Methodologies and Intelligent Systems for Technology Enhanced Learning*, 11th International Conference (Vol. 326, p. 95).
- Kaliisa, R. and Dolonen, J.A. 2022. CADA: a teacher-facing learning analytics dashboard to foster teachers' awareness of students' participation and discourse patterns in online discussions. *Technology, Knowledge and Learning*, pp.1-22.
- Kilburn, D., Nind, M. and Wiles, R., 2014. Learning as researchers and teachers: The development of a pedagogical culture for social science research methods? *British Journal of Educational Studies*, 62(2), pp.191-207.
- Lehti, S. and Lehtinen, E. 2005. Computer-supported Problem-based Learning in the Research Methodology Domain. *Scandinavian Journal of Educational Research*, 49(3), 297-324.
- Mazza, R. and Dimitrova, V. 2007. CourseVis: A graphical student monitoring tool for supporting instructors in web-based distance courses. *International Journal of Human-Computer Studies*, 65(2), 125-139.
- Maiorana, F., Csizmadia, A.P. and Richards, G.M., 2021, April. Metrics Based on Attention Metadata for Learning Resource and Assessment Repository. In *2021 IEEE Global Engineering Education Conference (EDUCON)* (pp. 413-419). IEEE.
- Murtonen, M. 2015. University students' understanding of the concepts of empirical, theoretical, qualitative and quantitative research. *Teaching in Higher Education*, 20(7), 684-698.
- Ndukwe, I.G. and Daniel, B.K. 2020. Teaching analytics, value and tools for teacher data literacy: A systematic and tripartite approach. *International Journal of Educational Technology in Higher Education*, 17(1), 1-31.
- Park, Y. and Jo, I.H., 2015. Development of the learning analytics dashboard to support students' learning performance. *Journal of Universal Computer Science*, 21(1), p.110-133.
- Saeed, M.A. and Al Qunayeer, H.S., 2021. Can we engage postgraduates in active research methodology learning? Challenges, strategies and evaluation of learning. *International Journal of Research & Method in Education*, 44(1), pp.3-19.
- Smith, P., 2019. Engaging online students through peer-comparison progress dashboards. *Journal of Applied Research in Higher Education*, 12(1), pp.38-56.
- Susnjak, T., Ramaswami, G.S. and Mathrani, A. 2022. Learning analytics dashboard: a tool for providing actionable insights to learners. *International Journal of Educational Technology in Higher Education*, 19(1), 1-23.
- Teddlie, C. and Tashakkori, A. 2009. *Foundations of Mixed Methods Research*. Thousand Oaks, CA: Sage.
- Wise, A. F. 2014. Designing pedagogical interventions to support student use of learning analytics. In *Proceedings of the Fourth International Conference on Learning Analytics and Knowledge* (pp. 203-211). ACM.

Likert scales and questions - uses and abuses

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Abstract: when conducting business and management research, the most common strategy employed for collecting primary data is either interviews or questionnaires (or both). When questionnaires are used to collect primary data a very common approach used is to construct questions which can be called Likert-type questions or Likert scales. Numbers are allocated to the question responses of each question.. Often, this is followed by performing arithmetic or statistical operations on the allocated numbers. In many cases encountered by the author, the analysis has even included techniques such as parametric statistics and factor analysis. This paper explains why such simplistic approaches are completely invalid and should never be used. It goes on to explain how analysis can be done whilst avoiding typical hazards. Often, the writers of such papers do not understand or explain levels of measurement. Of course, Likert scales are at an ordinal level of measurement which would normally preclude the use of arithmetic, statistical, factor analysis techniques there is an additional problem of reliability because different people will interpret terms such as strongly disagree and disagree, differently. Likert was aware of these problems when writing the original paper in 1932 although at that time the term “levels of measurement” was not in use. This paper provides approaches and suggestions for avoiding the problems of data analysis when using Likert-type questions. This paper should be of assistance to those who intend to use Likert-type questions in the questionnaire.

Keywords: levels of measurement, Likert questions, factor analysis.

1. Introduction

This paper is inspired by the number of student dissertations the author has had to deal with in the past few years where the students collected primary data by means of questionnaires containing Likert -type questions. Typically, the analysis of the primary data has involved converting the Likert question responses into numbers and then performing arithmetic and statistical operations on the resulting numbers.

The paper gives more detail of these abuses of Likert -type questions and the analysis approaches used. It discusses and presents ways in which Likert -type questions can be used more reasonably as a precursor to data analysis. This paper also deals with the controversy in the literature about the appropriate use of Likert -type questions.

2. Common Abuses

A typical problematic dissertation proceeds like this. The overall structure of a dissertation is: front matter (any mandatory preliminary pages such as declarations), abstract, keywords, acknowledgements, contents, lists of tables and diagrams, acronyms and abbreviations) introduction (setting out background, aim, objectives, summary of approach, dissertation structure); literature review; methodology (setting out key methodological choices, methods of analysis, anonymized primary data sources, perhaps sample questions, summary comments); results; analysis; discussion (to include discussion of differences between primary and secondary data); conclusions; back matter (list of references at a minimum). Although many dissertations place the literature review before methodology, there are very good reasons why generally, methodology should come immediately after the introduction chapter. This is because there are important comments to be made in methodology about how the literature review will be conducted. For example, it is very unlikely that all possible references related to the topics discussed in the dissertation can be read and taken into account, therefore some kind of sampling is needed when selecting sources of secondary data to consider. Searches can be made of red suitable publishers of peer-reviewed journal papers using random sampling or even weight the available sources by a measure such as citation count.

Key methodological choices for such dissertations, usually include quantitative, deductive, and survey by questionnaires. Sampling is very rarely simple probabilistic sampling because it is common for the population not to be well defined or available.

Questionnaires typically contain Likert-type questions. There is usually poor or no discussion of levels of measurement. Analysis proceeds by allocating numbers to question responses, the most common encountered being: strongly disagree = 1; disagree = 2, neutral =3, agree = 4, strongly agree =5 (or the other way round). Essential matters missing are level of measurement, scales of measurement, and reliability.

Taking reliability first, if reliable questions are questions that mean the same thing different people, then the ends of the Likert scales of 1-5 are likely to be an reliable because different people will take different views as between strongly disagree and disagree or agree and strongly agree. Likert recognises this difficulty, but not presenting any discussion of levels of measurement, does present examples of five-point and three-point scale (Likert, 1932). Turning to levels of measurement, it should be clear that Likert -type scales of 1-5 or 2-4 are at an ordinal level of measurement (because it cannot be assumed that the distances between the available question responses are in any sense a quick distant). This means that primarily, facing those numbers generated from the Likert -type questions cannot be subjected to normal arithmetic or statistical operations. Verification of that only requires looking at the case where disagree = 2 and agree = 4, it can be seen immediately that if those numbers can be processed by normal arithmetic operations, the result is that agree = 2* disagree! Such a conclusion is obvious nonsense.

To compound the initial level of measurement problems associated with Likert -type questions and converting responses to numbers, the problematic dissertations usually proceed by performing factor analysis and regression calculations on the resulting numbers. This usually demonstrates a serious misunderstanding of the appropriateness of factor analysis generally, and regression given the problems of performing arithmetic and statistical operations on ordinal measurements.

Analysis usually starts by trying to use and apply some tests to establish that the use of factor analysis is appropriate. An example of such a test is Cronbach's Alpha. The author of this paper has never seen one of these dissertations discuss Cronbach's alpha or even contain a citation to a reference covering the use of such a test. One example of an appropriate citation is Cronbach (1951). Other tests that may be included in the preliminaries to factor analysis are the KMO (Kaiser–Meyer–Olkin) test (based on Kaiser, 1970 and/or Kaiser and Rice, 1974) , and Bartlett's Test of Sphericity (based on Bartlett, 1937)).

The use of factor analysis in these problematic dissertations is not usually resolved by a careful discussion of factor analysis in terms of what it is trying to do, and how to do it properly. In essence, factor analysis can help where there is a large dataset involving multiple dimensions. Initially, factor analysis looks at the dataset to see if most of the variance can be accounted for by a small number of hypothetical factors. Correlation analysis is used to see if there are any significant relationships between the factor analysis hypothetical factors and the dataset dimensions. A discussion of this is normally missing in the problematic dissertations. More fundamentally, the dissertation dataset is usually formed from ordinal scales derived from the Likert -type questions. This means that factor analysis is not an appropriate form of analysis because it really needs interval or ratio levels of measurement before it can be used. Doing so can introduce insurmountable problems of incommensurability.

What has been observed in the problematic dissertations is that very few present the results of converting Likert -type questions to numeric scales of 1-5 by means of simple bar charts for the question responses available. There is nothing wrong with doing that. Slightly more dissertations present results in terms of average scores obtained by calculating the average score for each question following converting question responses to numbers. This is not a valid arithmetic operation on ordinal scales. Most dissertations do not present questionnaire results using descriptive statistics but ignore the issue and go straight on to present the results of inappropriate tests to check whether valid use can be made of factor analysis. Of course, these tests are being used in an inappropriate context and should not be used in such a way.

3. Likert

In preparing this paper, it proved impossible to obtain a clean original copy of Likert's paper, made more difficult by the lack of responsiveness by APA.

Likert's subject of interest was the "measurement of attitudes" (Likert, 1932). He starts with a detailed discussion about "what is an attitude?". There has been considerable research over the years about attitudes and they measurement, but the author of this paper would venture to provide operational definition of attitude which will be used throughout this paper: an attitude is a predisposition to behave in a particular way in response to a particular situation. Therefore, attitude measurement forms part of disposition measurement. Some key problems include: how consistent over time is someone's predisposition to behave in a particular way?; How consistent are a person's attitudes, even in the simple sense the consistency of answers to the same question when a person is asked the question multiple times with time gaps between being questioned?; How contextually-dependent our propensities to behave, and how to measure such contexts? This paper is not going to try to answer any of such questions, but they are important and the

interested reader is referred to Likert's original paper and detailed issues of consistency and correlation addressed by writers such as Cronbach (1947, 1951).

When constructing a Likert -type questionnaire, it is important to create sets of questions that are relevant to the attitudes being measured. Likert does this when he explains "The project conceived in 1929 by Gardner Murphy and the present writer aimed first of all to present a wide array of problems having to do with these five major "attitude areas": international relations, race relations, economic conflict, political conflict and religion. The attitude areas best covered in the questionnaire are those of race relations, international re- lations, and economic conflict. It was our conviction that very high specificity would exist among the elements used in our questionnaire, except insofar as the questions clearly dealt with the same issues" (Likert, 1932; p11). Likert shows a number of ways he presents questions and allocate numbers to the responses:

4. Likert Questions and Scales

Likert uses a variety of ways to present questions and allocate codes to the available answers. These can be questions with three possible answers

14. Should the United States enter the World Court?

YES	?	NO
(4)	(3)	(2)

or set of questions with codes for the particular responses

16. How much military training should we have?

- (a) We need universal compulsory military training. (1)
- (b) We need Citizens Military Training Camps and Reserve Officers Training Corps, but not universal military training (2)
- (c) We need some facilities for training reserve officers but not as much as at present. (3)
- (d) We need only such military training as is required to maintain our regular army. (4)
- (e) All military training should be abolished. (5)

or the most common which is questions and answers on a scale from strongly disagree to strongly agree and codes 1-5.

17. All men who have the opportunity should enlist in the Citizens Military Training Camps

Strongly				Strongly
Approve	Approve	Undecided	Disapprove	Disapprove
(1)	(2)	(3)	(4)	(5)

A quick look at the numbers suggested by Likert for the possible answers in all these three questions shows that there is no usefulness whatsoever in changing the responses to the numbers. Doing so will mislead easily anyone who attempts to make any use of the numbers in an arithmetic sense. Indeed, there is difficulty in relation to the sample question 16 above in that it is not obvious that these questions should be treated as mutually exclusive and it is certain that the codes associated with questions could not be used in any arithmetic or statistical sense. Another point can be made about the above sample questions taken from the Likert's paper: the paper is about attitude measurement. As mentioned above, an attitude is a propensity to behave in a particular way in a certain situation. Therefore, attitude and belief are not the same things. The sample questions are more concerned with measuring belief than attitude. Of course, a point can be reached were a belief is significant in forming someone's attitude.

5. Discussions about using Likert questions

In this paper it can be seen that the use of Likert -type questions and the allocation of codes to the answers is seriously problematic and should not be done without very careful attention to the details of problems that can arise. Dissertations that set their methodology to use Likert -type questions in questionnaires to collect primary data should be completely discouraged. Having said that, why do so many dissertations adopt a methodology of questionnaires with Likert -type questions followed by completely inappropriate factor analysis? A lot of responsibility must lie with the dissertation supervisors themselves who do not pick up the problems discussed above, do not encourage their students to deal with the problems, or indeed, are directly responsible for recommending the approach to the students. Keep in mind that Likert was concerned with measuring attitude. Many dissertations are not concerned with problems of measuring attitudes. Questionnaires in dissertations to collect primary data are concerned to ask questions but many topics, not just attitude measurement. In most cases, it would be better to construct questionnaires using whatever questions are appropriate, then checking the reliability and validity of the questions before proceeding to use it for the primary data collection.

Given the potential problems of Likert -type questions and scales and the fact that Likert's original paper appeared as far back as 1932, there must have been subsequent debate about the use of Likert's work. Indeed, there has been and we should look at some of it.

Louangrath summarizes "Empirical evidence shows that non- Likert scale (0,1,2,3) is 92% reliable while the Likert-type of scale had 90, 89, and 88% reliability. Validity test showed that non-Likert scale was 93% reliable, while the Likert-type scale had 89, 61, and 57% precision. Through Monte Carlo simulation and NK landscape method for optimization, the ability of information retention for non-Likert scale was 0.96 and 0.73, 0.75, and 0.77 for Likert scales. We standardize the scale efficacy in a 5.0 system, the non-Likert scale is 4.73 and 2.35, 2.45, and 2.41 for Likert scales." (Louangrath, 1018; p50).

Joshi et al (2015) summarize the variety of views about Likert scales and levels of measurement thus: "The first school of researchers and statisticians consider Likert scale as ordinal scale. They argue that choices or responses are arranged in some ranking order. However, as this scale doesn't show the relative magnitude and distance between two responses quantitatively, it can't be treated as interval scale. The other school interprets this dilemma from a different perspective, stating that when the aim of the researcher is to 'combine' all the items in order to generate a 'composite' score for an individual rather than separate analysis of single item responded by all individuals, then this individualistic summative score (for all the items) of a participant shows a sensible realistic distance from the individual summative score of another individual; hence, can be labeled as 'interval estimates.'" Joshi et al;p300).

Louangrath, and, Joshi et al., provide summaries of different aspects of Likert scales. In this sense, they neither agree nor disagree with each other, so both contributions can be combined when constructing an overall view about Likert-type questions and Likert scales stop both their papers help the researcher as gateways into related literature that addresses "controversies about Likert" (hereinafter called "Likert controversies").

For the purposes of this paper, it is sufficient to note that in the light of the identified Likert controversies, students should be steered well away from dissertations that include the collection of primary data by the blind use of Likert-type questions.

The problematic dissertations that use the unfortunate combination of questionnaires based on Likert-type questions followed by factor analysis should be considered to be fundamentally flawed methodologically if they fail to handle the resulting Likert controversies or can demonstrate that factor analysis is appropriate by the blind use of the pre-factor analysis tests discussed above. Therefore, it dissertation based on that methodological set of choices including Likert -type questionnaires followed by factor analysis will normally be assessed as a failure. Over many years, this paper's author has seen several dissertations fail for this reason and has only seen one dissertation that achieved a pass mark because it included a detailed and careful discussion of the advantages and disadvantages of Likert questionnaires, but the pass was only a bare pass because of the failure to deal adequately with the problems related to the use of factor analysis.

6. Factor Analysis

An example of scenarios where the use of factor analysis is appropriate, can be expressed like this: there is a dataset that has been created for a particular research situation by using a number of measures of dimensions that may be considered important when trying to construct a model of what may be required to achieve a

particular result. That statement is too abstract, so let's look at a couple of real scenarios the author of this paper has looked at statistically. The first example scenario is concerned with trying to measure bank customer satisfaction. The dataset is constructed by obtaining a number of measures that may be related to customer satisfaction: statements by the customer of feelings of satisfaction or dissatisfaction; measures of the activities in the bank performed by the customer; measures of the context in which the customer interacted with the bank (such as location of the bank, bank layout, staff demeanour, ease of performing the required transaction, waiting time, behaviour of other customers, knowledge of bank staff...). The question of interest is: "what are the most important factors resulting in good customer satisfaction?". The second scenario concerns a dataset of a number of measures of factors that influence a person's perception of the tranquillity of a rural environment. The dataset includes measures such as: a person's perception of tranquillity; background noise from natural phenomena such as birds or wind; background noise from activities by other human beings such as parking, social intercourse, eating and drinking, using radios... The question of interest is what are the factors that contribute or detract from a person's feeling of tranquillity?

For both of the examples, there is a dataset containing measures of multiple dimensions such as those mentioned. Factor analysis is used initially on the whole dataset to ask a question like "how many hypothetical factors can be constructed to account for the variance in the dataset?". Factor analysis will produce an initial list of hypothetical factors and how much of the variance is accounted for by each factor. The next stage is to explore correlation between the factor analysis hypothetical factors and the dimensions in the dataset being explored. The hope is statistically significant correlations will be identified in order that the factor analysis hypothetical factors can be expressed in terms of the dimensions in the dataset.

This means that the student decides to use factor analysis of the dataset obtained by the dissertation questionnaire, needs to be sure of the identity of the specific dimensions being explored by the questionnaire.

There are several books available which discuss factor analysis and its applications, such as (Pett et al, 2003) and if the researcher is using SPSS for the factor analysis, a helpful book is (Pallant, 2020).

7. Summary

following the discussion above it is very difficult to understand why dissertations use that unfortunate combination of Likert questionnaires and factor analysis at the heart of the dissertation research methodology. A summary of all the key points made may help the person who is still not yet sure about the issues raised.

Whether the methodological decision is made by the student or the supervisor, it is very unwise to decide to make use of Likert -type questionnaires, and doing so should be considered as deprecated. Likert's original paper was published in 1932. Since that date, there has emerged a considerable amount of research literature about several key issues related to Likert-type questionnaires. This paper summarizes the literature in terms of a set of "Likert controversies". These controversies remain today and have not been resolved since 1932. *Prima facie*, Likert scales are at an ordinal level of measurement in the absence of appropriate validity tests to demonstrate that scores allocated to Likert -type question responses, form a genuine scale and the points can be treated as equidistant (in other words, they can be treated as interval scale equivalents). 5-point Likert -type questions have reliability problems at the ends of the scale (this can be mitigated to some extent by the use of 7- or 10-point questions). A Likert -type questionnaire where question responses are allocated numbers is unlikely to yield a dataset that is suitable for factor analysis unless great care has been taken to group the questions according to themes to be investigated in the research (a useful way to do this would be to include thematic analysis among the techniques to analyse it dissertations secondary data). Common tests (such as Cronbach, KMO, and Bartlett) are unlikely to be valid pre-factor analysis tests of the suitability of a dataset created from a Likert -type questionnaire by allocating codes to question responses.

8. Recommendations

Following what has been said above, the key recommendation must be: don't use as a research methodology, Likert -type questionnaires followed by factor analysis!

It is obvious that some researchers have a preference for Likert -type questionnaires. In the absence of a convincing discussion that it is reasonable to consider scales resulting from allocating scores to question responses, the resulting scales must be considered as ordinal. That can work if the researcher summarises the questionnaire results by using some device such as bar charts to represent the responses to each question individually. There should be no attempt to compute an average response for questions using such scores. This

also means that in terms key methodological choices, a research using Likert -type questionnaires cannot be quantitative or deductive. It can only be qualitative and inductive. There may be situations where Likert -type questionnaires can be used to obtain inductive results. Steer students away from collecting primary data by means of a Likert -type questionnaire, followed by factor analysis.

References

- Bartlett, M. S. (1937). "Properties of sufficiency and statistical tests". *Proceedings of the Royal Statistical Society, Series A* 160, 268–282
- Cronbach, Lee (1947) "Test "reliability" and its determination Psychometrika – Vol. 12 (1)
- Cronbach, Lee J. (1951) "Coefficient Alpha and the internal structure of tests". *Psychometrika* – Vol 16(3) September, 1951 pp 297-334.
- Joshi, Ankur; Kale, Saket; Chandel, Satish and Pal1, D. K. (2015) Likert Scale: Explored and Explained. *British Journal of Applied Science & Technology* 7(4): pp396-403
- Kaiser, Henry F. (1970). "A second generation little jiffy". *Psychometrika*. **35** (4): 401–415.
- Kaiser, Henry F.; Rice, John (1974). "Little Jiffy, Mark IV". *Educational and Psychological Measurement*. **34**: 111–117.
- Likert, Rensis (1932) "A Technique for the Measurement of Attitudes". *Archives of Psychology*, No 140
- Louangrath, P. (2018). "Reliability and Validity of Survey Scales." *Inter. J. Res. Methodol. Soc. Sci.*, Vol., 4, No. 1: pp. 50-62.
- Pallant, Julie (2020) *SPSS Survival Manual: A Step by Step Guide to Data Analysis Using IBM SPSS (7th ed.)* Open University Press
- Pett, Marjorie (Marg) A; Lackey, Nancy R; and Sullivan, John (2003) *Making Sense of Factor Analysis: The Use of Factor Analysis for Instrument Development in Health Care Research*. Sage Publications

Development of the Methodology for Residential Investment Management During the Covid-19 Pandemic

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Abstract: Investing in residential property is a good investment instrument for individuals. The benefit of investing in a residential property is the potential for long-term appreciation in value. Historically, property values have increased over time, providing a solid return on investment for those who hold onto their properties for a significant amount; property provides a source of passive income through rental income. Investing in property is an attractive investment opportunity in emerging markets. Turkey is considered an emerging market. Like many emerging markets, it faces several economic and political challenges, including high inflation, a large current account deficit, and political instability. Investing in property in emerging markets also comes with certain risks, including currency fluctuations, political instability, and uncertain legal and regulatory environments. During the SARS outbreak, the property market in Hong Kong was significantly affected. The Spanish flu pandemic had a significant impact on the property market. During the 19th-century cholera pandemics, there were instances of substantial disruption to property markets. The COVID-19 had significant impacts on the residential market. Developing a methodology for individuals to use for their residential investment can be challenging, as it requires consideration of various factors. There are a variety of resources available for individuals who are interested in learning more about investing in property, and people are able to educate themselves in the field of property investment. In this study, we examined individuals' residential property investments in Turkey during COVID-19, and the factors that influenced their investments. We examined whether individuals' consideration of a single advantage in residential investments provides them with financial benefits. We examined the parameters that residential investors can follow to achieve success with their investments.

Keywords: COVID-19, housing, investment, management, methodology, pandemic.

1. Introduction

As the COVID-19 began to hit the world, it was not as easy to predict what might happen next as in other crises. The most recent pandemics were: Spanish Influenza, Asian Influenza, Hong Kong Influenza, Russian Influenza (H1N1), Avian Influenza (H5N1), SARS and A(H1N1) Influenza (Gensini, Yacoub and Conti, 2004). People were partly used to the signals of impending economic crises and the risks and opportunities of crises, but this time they were faced with a crisis, they could not identify. The COVID-19 brought different opportunities to the residential market. While the property sector is affected by economic crises in the same way as other asset markets, the COVID-19 affected the residential sector economically and in terms of its trends. In 2020, when the COVID-19 was prevalent in Turkey, the sales of residential property on loan (total) peaked at 307 thousand units - the highest in history - between June and August (TUIK, 2023).

When first-time residential buyers or individual investors who consider residential property as an investment instrument (Coşkun, 2016) made their investment decisions during the COVID-19 period: did they systematically make their investment decisions, did they know how to make decisions and follow the analyses they should have followed in the residential market, or did they make their investment decisions without any knowledge of the residential market (Case and Shiller, 1988)? Compared to other asset markets, the residential property market is where everyone has the best information, but personal intuition (Gallimore and Gray, 2002), the media (Katz, 2006) and other individuals effectively shape this information. Our research question was: What are the key factors to consider when developing a methodology for managing property investments during a pandemic? We aimed to develop a comprehensive methodology to manage residential investment in times of pandemic. The reason for our focus on the COVID-19 period was similar to that of the studies by Kartal, Kılıç Depren and Depren (2021): because the pandemic was prevalent in Turkey and affected many economic and financial variables.

When investing in property, individual investors gather information from many sources and use it to decide where to invest. As individual investors are not professionals, they may not follow a methodology when making investment decisions. Having a residential investment methodology that individual residential investors can follow can help improve the accuracy of such investments. In times of global crisis, such as the COVID-19 pandemic, individual residential investors need more than the methodology they use in non-crisis periods. Global crises can bring opportunities as well as risks. This study developed a methodology for residential

investment that individual property investors can follow in times of crisis. This investment methodology identified the indicators to follow at each stage. This research methodology will enable a better understanding of the methodology of residential investment management during a pandemic and provide insights into optimising the investment strategy to achieve success in the residential property market.

In Turkey, a limited number of studies can help develop methodologies that individual residential property investors can use to make investment decisions. This article aims to fill this gap. In other parts of the article, topics such as residential investment management, developing a methodology, the COVID-19 and residential investment management are addressed. The methodology of the study and the results of the analyses are then presented. The discussion and conclusions section discusses the study's outcome, limitations, and suggestions for future studies.

2. Management and Methodology Development for Residential Investment

Investors consider the residential investment a safe investment (Case and Shiller, 1988). Residential investment can involve purchasing a property to rent it out or reselling it at a higher price in the future. Residential investment can be a lucrative way to generate income and build wealth over the long term (Erdoğan and Büyükduman, 2018). However, it also carries risks and requires careful consideration of factors. Effective residential investment management requires financial expertise, knowledge of the residential property market, and strong management and communication skills.

Investment methodology is the set of principles, strategies, and tools used by investors to make investment decisions and manage portfolios. In investment decisions, investors do not always adhere to the investment method, and they have different behavioural biases, namely overconfidence, disposition effect, herding bias and home bias in investment decisions (Kumar and Goyal, 2015). An effective investment methodology typically includes research, analysis and risk management techniques and may require ongoing adjustments and adaptations in response to changing market conditions and investor needs. According to Balanska and Yemelyanov (2021), risk planning in residential investment should be based on a preliminary assessment of the current level of risk. The principles of investment methodology include diversification, risk management, research and analysis, long-term focus, flexibility and adaptation, and active management. Although the residential property market is considered to be less volatile, Ball and Wood (1999) suggest that residential investment is volatile not only in the short term but also in the medium term, with evidence of long construction cycles in most countries. The principles of residential investment methodology include location, property analysis, finance, risk management, diversification, property management and taxation. Among these principles, only the findings of Goetzmann's (1993) study on diversification are noteworthy: A one-year investment in a residential property carries almost twice the risk of a well-diversified portfolio, but a five-year investment is relatively stable.

Residential investment methods rely on various tools to help investors make informed decisions and manage their investments. Tools that can be used in residential investments include: property websites, estate agents, property management software, property investment analysis software and websites, and mortgage calculators. As an investment method, residential investors should formulate their investment decisions by taking the following steps (Table 1): Define your investment objectives, determine your investment strategies, establish your investment criteria, develop a property analysis process, define your exit strategy and implement your risk management strategy.

Table 1: Residential Investment Methodology.

Goals	Definitions
1. Defining investment goals:	Investors should define their investment goals, such as generating passive income, building equity, or long-term appreciation.
2. Determining investment strategy	Investors should determine their investment strategy based on their goals, such as fix and flip, buy and hold, or house hacking.
3. Establishing investment criteria	Investors should establish criteria for the properties they consider, such as location, price range, size, and condition.

4. Developing a process for analysing properties	Investors should develop a process for analysing potential investment properties, which may include assessing the property's potential rental income, estimated expenses, and potential for appreciation.
5. Defining exit strategy	Investors should define their exit strategy, such as selling the property for a profit or holding onto it for long-term rental income.
6. Implementing risk management strategies	Investors should implement risk management strategies to mitigate potential risks, such as conducting a thorough property inspection, securing proper insurance, and maintaining a cash reserve for unexpected expenses.

3. COVID-19, Home Investments and Developing Methodology

The COVID-19 pandemic hit the residential investment market severely. The COVID-19 pandemic, rent, weighted average cost of funds and deposit interest rate play an important role in residential prices, but macroeconomic variables are ineffective in Turkey (Kartal, Kılıç Depren and Depren, 2021). Some of the points where the COVID-19 hit residential investment were: reduced demand for rental properties, delayed construction and renovation projects, remote working, lower interest rates, fluctuating residential prices, and increased focus on property management. The COVID-19 pandemic affected each country differently. In Turkey, it affected the residential sector by reducing foreign investment in residential property, introducing remote working practices for the first time, and increasing government incentives (Table 2).

Table 2: Residential Investments in Turkey During the COVID-19 Pandemic.

Goals	Definitions
Reduced demand for rental properties	With travel restrictions and lockdown measures in place, there was a decrease in demand for rental properties, especially in popular tourist destinations.
Delayed construction and renovation projects	The pandemic caused delays in construction and renovation projects that affected the availability of new properties on the market.
Reduced foreign investment	Turkey has traditionally been an attractive market for foreign investors, but the pandemic has caused a reduction in foreign investment due to economic uncertainty
Fluctuating residential property prices	The pandemic caused fluctuations in property prices in Turkey, experiencing an increase.
Remote work	The rise of remote work has resulted in a shift in property demand, with more people seeking larger apartments or houses with dedicated office space. Remote working has also increased the demand for residential properties in rural and suburban areas.
Government support	The Turkish government has implemented measures to support the residential market during the pandemic and increased access to financing for homebuyers.

The COVID-19 pandemic was a period of both risks and opportunities in the Turkish residential market, (Table 3). The Risks are economic uncertainty, fluctuations in demand and political instability. Moreover, with many companies shifting to remote working, there may be less demand for property in certain areas, such as city centres. Gönen and Çetinkaya (2021), in his study of Google Trends data, suggests that interest in single-storey detached houses with gardens increased after the pandemic in Turkey. There were also changes in demand on a global scale. After the COVID-19 pandemic, consumers prefer larger areas, balconies and terraces, private greens, and external condominium spaces, according to Tajani et al., (2021).

Table 3: The risks and opportunities in the residential market for individual investors during the COVID-19 pandemic in Turkey.

Risks	Opportunities
Economic uncertainty Fluctuations in demand Political instability	Low-interest rates Appealing exchange rate Bargain prices

Turkey has been experiencing political instability that can impact investor confidence in the residential market recently. Opportunities are low-interest rates, appealing exchange rates and bargain prices. The Turkish government lowered interest rates to make it more affordable for investors to purchase properties and for homeowners to refinance their mortgages. CPI, dollar and house price index variables found to affect house

sales (Yalçın Kayacan and Anavatan, 2022). The Turkish lira has significantly weakened against major currencies over the past few years, making the cost of buying a property in Turkey more affordable for foreign investors and those with savings in foreign currencies. Due to the economic uncertainty, some properties may be priced lower than usual, creating opportunities for investors to find bargains. Although investors can take advantage of opportunities in times of crisis, they may not be able to do so efficiently. According to Immergluck and Law (2014), Although there was a lot of short-term buying and flipping activity at the beginning of the crisis through 2008 and 2009, investors eventually began to focus more on buy-to-let investments in those areas.

The COVID-19 pandemic requires two more steps to be added to the six steps listed in Table 1 in the residential investment method. Due to the factors listed in Table 2, the rapidly changing residential market causes general and local market fluctuations. In the decision-making process of investors, the information obtained through the information channels (Figure 1) may make sense for the market in general but may not be accurate for the market where the investor considers trading. The two objectives set out in Table 4, for investors to assess the current residential property market and adapt to changes in the market during the COVID-19 process, should be included in the residential property investment methodology set out in Table 1. This allows investors to make decisions in volatile market conditions and adapt to current market changes.

Table 4: Residential Investment Methodology During the COVID-19 Pandemic.

Goals	Definitions
7. Assessing the current market conditions	Investors should analyse the impact of the pandemic on the residential market and assess the current market conditions, including demand, supply, and pricing trends.
8. Monitoring and adapting to market changes	Investors should continuously monitor the market conditions and adapt their investment strategy and criteria to stay aligned with their goals.

In Figure 1, we estimate two main sources of information that residential investors can use from the time they start considering a residential investment until they realise or abandon their investment. One of these sources is the research channel, and the other is the information acquisition channel. These two main sources can interact and influence the investment decision.

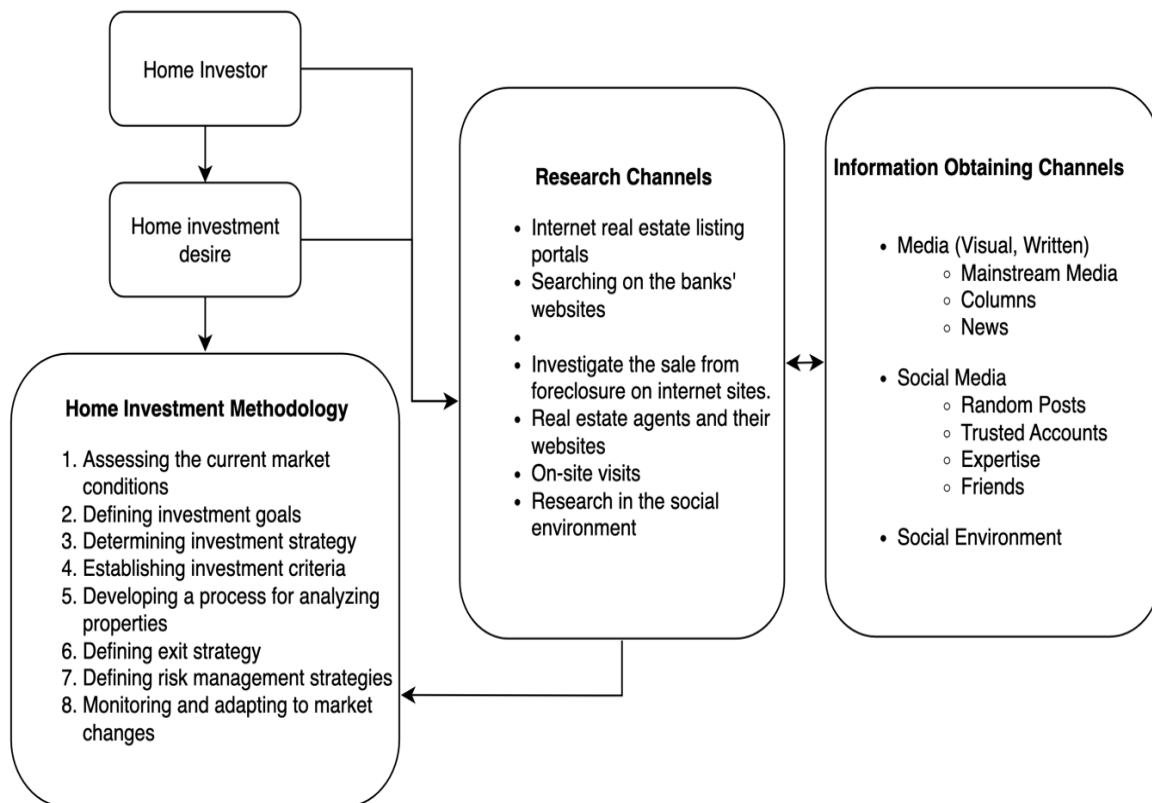


Figure 1: Residential Investment Methodology, Research and Information Acquisition Channels.

Assessing current market conditions is crucial to making informed decisions in the residential market. This process involves gathering market data, analysing market trends, evaluating local economic factors, and assessing regulatory and legal issues to provide valuable insights into the current state of the market. Property prices, sales volume, days on the market, property stock, new residential property supply, mortgage interest rates, employment rates and population growth are crucial to monitoring the residential market and achieving investment objectives. By identifying potential investment opportunities and developing investment strategies, investors can make informed decisions based on the analysis of the data collected.

Defining residential investment goals is the next step in investing in property. By monitoring and evaluating progress through economic indicators such as GDP, employment rates, inflation rates, interest rates, residential property starts and residential property price indices, investors can define their residential investment goals and achieve success in the property market.

Defining a residential investment strategy involves conducting a market analysis and developing a financial plan and a project management plan to achieve investment goals while monitoring and evaluating progress is essential. Population growth, employment rates, income levels, interest rates, residential property starts and property price indexes can provide valuable insights into current market conditions and assist in defining the residential investment strategy.

Establishing criteria for residential investment involves identifying investment objectives, conducting market analysis, developing selection criteria, identifying potential investment opportunities, evaluating and selecting investment opportunities, and monitoring and evaluating investment performance. Population growth, employment rates, income levels, interest rates, residential property supply and demand, and residential property price indices play a crucial role in developing selection criteria and ultimately leading to successful investment opportunities.

Developing a property analysis process is an essential step in the residential investment process. By defining criteria, gathering data, conducting a market analysis, analysing property condition and potential for appreciation, calculating return on investment and comparing properties, investors can make informed decisions about which properties offer the best return on their investment. Residential market trends, employment and income growth, interest rates, demographics, infrastructure and development, as well as property-specific factors, play a crucial role in the analysis process.

Defining an exit strategy is crucial for residential investors who want to achieve their investment goals. By defining the investment timeframe, assessing market conditions, analysing property performance and considering tax implications, investors can create an effective exit strategy for their residential investment. Residential market conditions, property-specific factors, interest rates, tax implications, market demand and economic conditions should be considered.

Property investment is inherently risky, and risk management strategies are critical to mitigating potential losses. By identifying potential risks, developing a risk management plan, diversifying investments, analysing market trends, conducting due diligence, establishing contingency plans, and monitoring and adjusting strategies, investors can mitigate risks and maximise returns on their residential investments. Economic stability, interest rates, market demand, vacancy rates, property-specific factors and the legal and regulatory environment can inform risk management strategies.

Monitoring and adapting to market changes is essential to the success of investing in the residential property market. Economic indicators; property sales and prices, residential stock, interest rates, employment rates, population growth, consumer confidence and residential affordability can provide valuable insights into potential investment opportunities or risks. By tracking market trends, monitoring economic indicators, keeping abreast of local regulations, keeping an eye on the competition, maintaining flexibility, building relationships with local experts and conducting regular portfolio reviews, investors can adapt to changing market conditions and adjust their strategies accordingly.

In order to make a residential investment decision based on the research and information channels shown in Figure 1, investors should repeat one to eight of the tasks shown in Figure 2. Each task requires different methods, and each method requires various economic indicators.

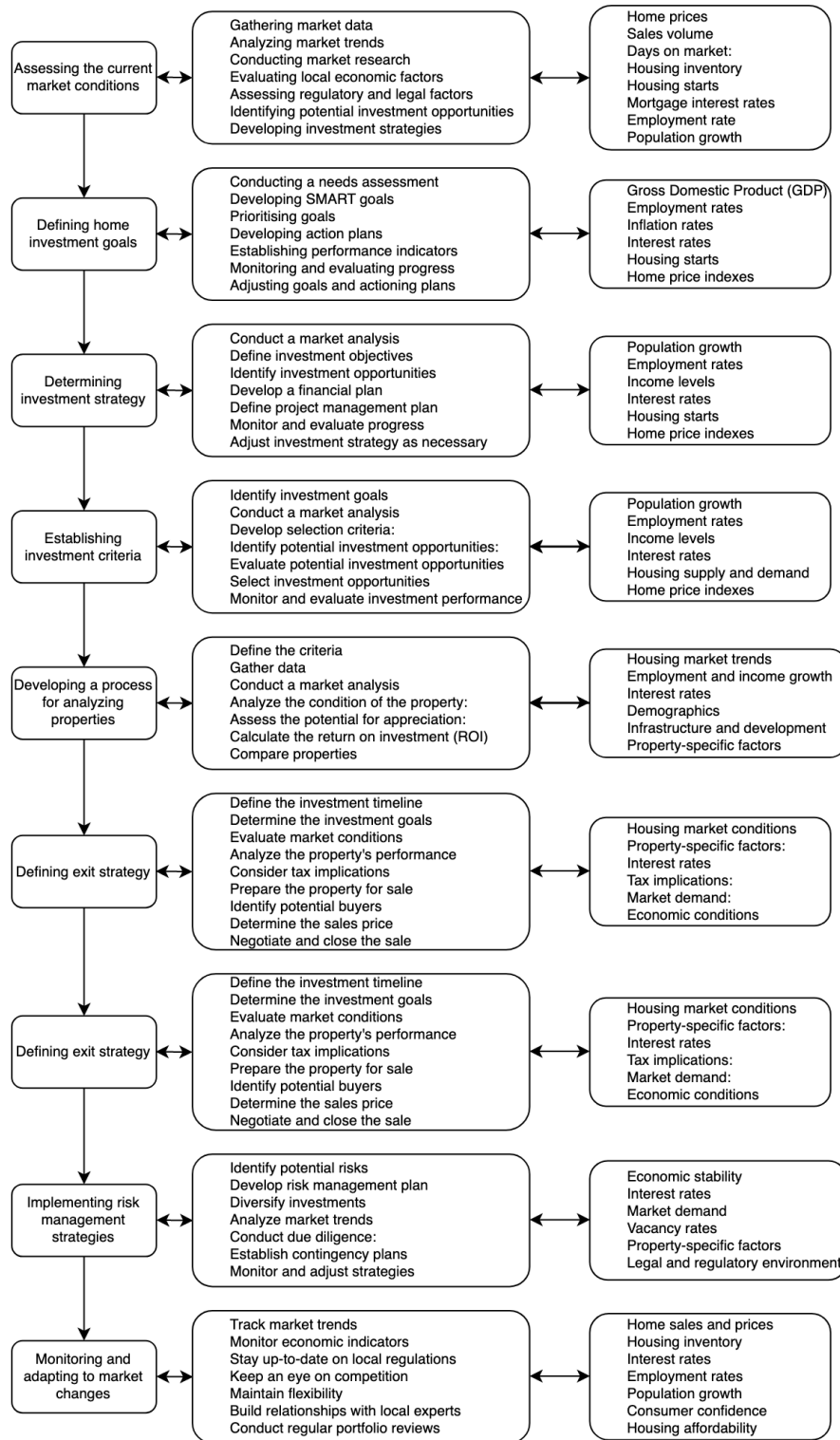


Figure 2: Tasks and Economic Indicators of Residential Property Investment Methodology.

Conducting a thorough market analysis is the first step in this process, including assessing local economic factors, regulatory and legal considerations, and potential investment opportunities. Once investment goals set, monitoring and measuring progress and adjusting goals and action plans to stay on track is essential.

Market trend analysis is a critical component of successful property investment. It involves tracking and identifying potential risks or opportunities. Regularly reviewing and adjusting investment strategies through due diligence ensures a strong and profitable portfolio. Flexibility and periodic portfolio reviews are essential. Economic indicators play a crucial role in assessing the investment potential of the property market. Monitoring

employment rates, residential property starts, house price indices, population growth, interest rates, and property-specific factors is important. Employment rates, in particular, significantly impact residential property demand. Supply and demand dynamics are also crucial. Residential property price indices provide insights into property valuation. Population growth influences housing demand, while interest rates affect affordability. By monitoring these indicators, investors make informed decisions when buying or selling property, adjusting strategies to stay ahead in the evolving market. Regular monitoring offers a comprehensive understanding of the property market's current and future state, facilitating well-informed investment choices.

Turkey faced the COVID-19 pandemic with different restrictions between 15/03/2020 and 31/11/2021. We analysed residential sales between these dates (TUIK, 2023) under three groups: total residential sales, mortgaged (loan) residential sales, and residential cash sales. Erdogdu (2023), in his research, defined the opportunity periods according to the minimum wage-average property scale as HoMiWaSOpp, the periods of opportunity when mortgage rates remain affordable compared to inflation as LIAI, and the periods of opportunity in real property price changes as CHO. Over a period of 22 months, referred to as the COVID-19 period:

- Based on the minimum wage to residential property price (MWMHPⁱ) scale, the opportunity periods were defined as HoMiWaSOpp.
- Based on the mortgage rate vs inflation rate relation (MRIRRⁱⁱ) scale, the periods of opportunity were defined as LIAI.
- Based on the real home price changes (RHPCⁱⁱⁱ) scale, the opportunity periods were defined as CHO.

As shown in Table 6, a total of 6 periods of HoMiWaSOpp, 11 periods of LIAI and 0 periods of CHO were measured in the 22 periods. In this respect, out of 22 periods, house prices were affordable in 6 periods on the 'minimum wage median home price' scale, and mortgage rates were affordable in 11 periods on the 'Mortgage rate vs inflation rate relation' scale. However, no period was cheap/affordable regarding real home price change. In the analysis of total dwellings sales, no positive change was observed in the six HoMiWaSOpp periods, and sales increased in nine of the 11 LIAI periods. In the analysis of residential property sales on loans, residential property sales on loans increased in one of the six HoMiWaSOpp periods and increased in six of the 11 LIAI periods. In the analysis of cash sales of residential property, cash sales of residential property increased in three of the six HoMiWaSOpp periods, and cash sales of residential property increased in nine of the 11 LIAI periods.

Table 6: Total, Credit and Cash Residential Sales and Opportunity Periods (Source: TUIK)

Period (Month/Year)	Total Home Sales			Mortgaged Home Sales			Cash Home Sales			Affordability/Opportunity			
	Total Home Sales (Adj.)	Monthly Homes Sales (Avg.)	YoY Changes	Mortgage Home Sales (Adj.)	Monthly Mortgage Homes Sales (Avg.)	YoY Changes	Cash Home Sales (Adj.)	Monthly Cash Homes Sales (Avg.)	YoY Changes	HomiWaSOpp	LIAI	CHO	
March 2020	103,70	106,00	-1,3%	41,4	33,4	%81,71	62,4	72,6	-%24,2		1	1	0
April 2020	42,80	100,10	-55,5%	17,1	30,8	-%23,92	25,7	69,3	-%65,1		1	0	0
May 2020	62,90	102,30	-28,3%	22,8	31,5	%60,36	40,1	70,8	-%45,5		0	1	0
June 2020	181,40	117,20	111,2%	96,9	41,3	%845,55	84,5	75,9	%11,7		0	1	0
July 2020	235,00	122,50	140,8%	133,9	40,3	%973,85	101,0	82,2	%18,7		0	1	0
Augusts 2020	178,90	125,60	38,7%	79,8	37,0	%100,36	99,1	88,6	%11,2		0	1	0
September 2020	130,50	127,60	-11,1%	34,0	36,0	-%41,26	96,6	91,7	%8,4		0	0	0
October 2020	122,50	121,80	-12,2%	26,2	31,4	-%46,81	96,3	90,4	%6,7		0	0	0
November 2020	112,50	118,10	-18,7%	24,5	31,3	-%44,32	88,0	86,8	-%6,8		0	0	0
December 2020	96,80	146,50	-49,8%	13,4	32,2	-%72,16	83,4	114,2	-%42,4		0	0	0
January 2021	70,60	86,30	-34,9%	10,7	26,4	-%73,38	59,9	59,9	-%12,2		1	0	0
February 2021	85,30	98,30	-31,6%	15,4	29,5	-%66,46	69,9	68,8	-%11,3		1	0	0
March 2021	101,60	106,00	-2,1%	19,9	33,4	-%51,84	81,7	72,6	%30,9		1	0	0
April 2021	95,90	100,10	124,1%	17,5	30,8	%2,49	78,3	69,3	%204,9		1	0	0
May 2021	71,00	102,30	12,8%	12,7	31,5	-%44,5	58,3	70,8	%45,5		0	0	0
June 2021	128,60	117,20	-29,1%	27,6	41,3	-%71,55	101,0	75,9	%19,6		0	0	0
July 2021	141,50	122,50	-39,8%	27,0	40,3	-%79,85	114,5	82,2	%13,3		0	1	0
Augusts 2021	141,40	125,60	-21,0%	27,4	37,0	-%65,7	114,0	88,6	%15,1		0	1	0
September 2021	140,50	127,60	7,6%	28,4	36,0	-%16,35	112,0	91,7	%16,0		0	1	0
October 2021	148,00	121,80	20,8%	30,2	31,4	%15,34	117,8	90,4	%22,3		0	1	0
November 2021	170,70	118,10	51,7%	37,6	31,3	%53,69	133,1	86,8	%51,2		0	1	0
December 2021	206,80	146,50	113,7%	41,3	32,2	%209,33	165,5	114,2	%98,4		0	1	0

4. Discussions

The literature review suggests that the key factors in the increased success rate of non-professional residential investors are knowledge of the area and more research. D'Lima and Schultz (2021) suggest that investors earn higher returns from investments in the same neighbourhood as where they live. The same study also indicates that investors earn less from investing in their own property. Residential investors can achieve higher returns if they see residential investment as an investment. One of the general opinions is that residential investments are always profitable. However, Shiller (2015) attributes this belief to the fact that people are surprised by the change in the price of the property they bought to live in over the years. Nevertheless, when they analyse the property price change in relation to inflation, they can see that the result will not be as promising as it seems. Another accepted opinion that leads buyers to the purchase process is that residential property prices will increase constantly, and it will not be possible to buy a property in the future (Simon, 1955).

In the case of residential investment, investors are often interested in mortgage rates. Lorig and Suaysom (2022) suggest that the interest rate is the most critical among many factors that can be taken into account. Erdoğan (2023) states that in 2013-2022 when mortgage rates decreased compared to the previous 12-month period, the number of residential sales with mortgages increased. Moreover, on the scale of minimum wage and residential prices, the demand for residential properties did not increase when residential prices were appealing. The residential property market is heterogeneous compared with other asset classes. Zorn and Sackley (1991) argue that in heterogeneous asset markets, consumers can maximise their profitability through research. On the other hand, residential property is too expensive to invest on a trial-error basis (Bazerman, 2001).

5. Conclusion

In this research, we had the opportunity to examine the minimum wage to median residential property price (MWMHP) and mortgage rate vs inflation rate (MRIRR) indicators in the residential market in Turkey during the COVID-19 pandemic. As the real residential property price change indicator did not provide opportunities for home buyers during that period, we were not able to analyse that. According to the MWMHP indicator using the "minimum wage median home price" scale, our analysis shows that residential property prices were available in six of the 22 periods. Three of the six available periods were considered by cash house buyers and only one period was considered by those who bought a property with a mortgage. According to the MRIRR indicator with the "mortgage rate vs inflation rate" scale, residential loans were available in 11 of the 22 periods. Nine of the 11 available periods were considered by cash residential property buyers, and the remaining six were considered by those who bought a residential property with a mortgage.

Residential investors should follow these steps when making investment decisions: defining investment objectives, setting investment strategies, establishing investment criteria, developing a property analysis process, defining an exit strategy, and implementing a risk management strategy. The COVID-19 pandemic introduced two additional steps for investment decisions in times of crisis: 1. Assessment of current market conditions and 2. Monitoring, and adapting to market changes. These steps face certain challenges in times of crisis. The challenges faced when deciding to invest in Turkey during the COVID-19 pandemic: reduced demand for rental properties, delayed building and renovation projects, reduced foreign investment, fluctuating property prices, remote working, and government support. These challenges created both risks and opportunities for the residential property market. Risks: economic uncertainty, demand volatility, and political instability. Opportunities: low interest rates, favourable exchange rates, and low prices.

At the investment decision stage, residential investors conduct their research through research channels (all platforms hosting for-sale advertisements, visits to residential estate agents, and social circles), and obtain information through information channels (mainstream media, social media, and social circles). The investment decision should be based on a residential investment methodology that brings together all the information gathered. A residential investment methodology should consist of eight steps: assessment of current market conditions, definition of residential investment objectives, definition of a residential investment strategy, establishment of residential investment criteria, development of a property analysis, definition of an exit strategy, definition of risk management strategies, and monitoring, and adapting to market changes.

In the investment method consisting of eight steps, each task requires different methods and each method requires various economic indicators. After investment goals are set, it is essential to monitor and measure progress and adjust goals and action plans to stay on the right track. The analysis of market trends, economic

indicators, and residential property supply and demand is a critical aspect of a winning property investment methodology.

Future studies can analyse the role of the new technologies in residential investment and the effectiveness of different investment strategies under different market conditions. In the case of emerging technologies, such as blockchain and virtual reality, there is a need to explore how they can be used to improve real estate investment processes. These research topics can provide property investors with valuable insights, and help them make more informed investment decisions in the residential property market.

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References

- Balanska, O., and Yemelyanov, O. (2021) "The risk planning methodological principles for housing investment", *Three Seas Economic Journal*, 2(1), 8–13. <https://doi.org/10.30525/2661-5150/2021-1-2>
- Ball, M., and Wood, A. (1999) "Housing investment: Long run international trends and volatility", *Housing Studies*, 14(2), 185–209. <https://doi.org/10.1080/02673039982911>
- Bazerman, M. H. (2001) "Consumer research for consumers", *Journal of Consumer Research*, Volume 27(4), 499-504. <https://doi.org/10.1086/319624>
- Case, K. E., and Shiller, R. J. (1988) "The behaviour of home buyers in boom and post-boom markets", *National Bureau of Economic Research*, Working Paper 2748. DOI 10.3386/w2748
- Coşkun, Y. (2016) "Türkiye konut piyasasında talep eğilimleri ve bilgi bakışimsızlığına yönelik politika önerileri", *Bankacılar Dergisi*, Sayı (Vol. 96).
- D’Lima, W., and Schultz, P. (2021) "Residential real estate investments and investor characteristics", *Journal of Real Estate Finance and Economics*, 63(3), 354–393. <https://doi.org/10.1007/s11146-020-09771-8>
- Erdogdu, C. (2023) "Beyond Luck: The Key to Profitable Residential Real Estate Investments for Individual Investors in Turkey", *Journal of Design for Resilience in Architecture and Planning*, 4(1), 65–90. <https://doi.org/10.47818/drarch.2023.v4i1084>
- Erdogdu, C., and Büyükduman, A. (2018) *Sorularla Gayrimenkul Yatırımı*, Ceres Yayınları.
- Gallimore, P., and Gray, A. (2002) "The role of investor sentiment in property investment decisions", *Journal of Property Research*, 19(2), 111–120. <https://doi.org/10.1080/09599910110110671>
- Gensini, G. F., Yacoub, M. H., and Conti, A. A. (2004) "The concept of quarantine in history: From plague to SARS", *Journal of Infection*, (Vol. 49, Issue 4, pp. 257–261), <https://doi.org/10.1016/j.jinf.2004.03.002>
- Goetzmann, W. N. (1993) "The single family home in the investment portfolio", *Journal of Real Estate Finance and Economics*, (Vol. 6).
- Immergluck, D., and Law, J. (2014) "Investing in crisis: The methods, strategies, and expectations of investors in single-family foreclosed homes in distressed neighborhoods", *Housing Policy Debate*, 24(3), 568–593, <https://doi.org/10.1080/10511482.2013.850733>.
- Kartal, M. T., Kılıç Depren, S., and Depren, Ö. (2021) "Housing prices in emerging countries during COVID-19: evidence from Turkey", *International Journal of Housing Markets and Analysis*, <https://doi.org/10.1108/IJHMA-07-2021-0083>.
- Katz, E. (2006) "Rediscovering Gabriel Tarde", *Political Communication*, 23:3, 263-270, DOI:10.1080/10584600600808711
- Kumar, S., and Goyal, N. (2015) "Behavioural biases in investment decision making – a systematic literature review", *Qualitative Research in Financial Markets*, 7(1), 88–108. <https://doi.org/10.1108/QRFM-07-2014-0022>.
- Lorig, M., and Suaysom, N. (2022). "Optimal times to buy and sell a home", <https://doi.org/10.48550/arXiv.2203.05545>.
- Shiller, R. J. (2015) *Irrational Exuberance*, Princeton University Press, <https://doi.org/10.1515/9781400865536>.
- Simon, H. A. (1955) "A behavioural model of rational choice", *The Quarterly Journal of Economics*, 99-118. <https://doi.org/10.2307/1884852>.
- Gönen, T., and Çetinkaya, E. (2021), "Covid-19 salgınının konut tercihlerine etkisi", *Kent ve Çevre Araştırmaları Dergisi*, 3(2), 25-33. <https://doi.org/10.48118/yykentcevre.1008835>.
- Tajani, F., di Liddo, F., Guarini, M. R., Ranieri, R., and Anelli, D. (2021) "An assessment methodology for the evaluation of the impacts of the covid-19 pandemic on the Italian housing market demand", *Buildings*, 11(12). <https://doi.org/10.3390/buildings11120592>.
- TUIK, (2023). Home Sales <https://data.tuik.gov.tr/Bulten/Index?p=Konut-Satis-Istatistikleri-Aralik-2022-49526> [Accessed 20.03.2023]
- Yalçın Kayacan, E. and Anavatan, A. (2022) "Türkiye’de konut satışlarını etkileyen faktörlerin Kovid-19 süreci açısından incelenmesi: Sayma zaman serisi modeli", *İzmir İktisat Dergisi*, <https://doi.org/10.24988/ije.1129485>.

Zorn, T. S., and Sackley, W. H. (1991) "Buyers' and sellers' markets: A simple rational expectations search model of the housing market", *The Journal of Real Estate Finance and Economics*, 4, 315-325.
<https://doi.org/10.1007/BF00161932>.

ⁱMWMHP: Minimum wages-median home price ratio MWMHP

ⁱⁱ MRIRR: Mortgage rate vs inflation rate relation

ⁱⁱⁱ RHPC: Real home price changes

The Impact Of Remote Work On Organisational Climate Of Agile-Software Development Teams

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Abstract: Purpose: As a result of the changing labor market in a post-pandemic world, remote work in the IT sector is becoming almost a standard. It is known intuitively that the organisational climate changed compared to the stationary work, but it is difficult to determine how and what elements are going through the change. The aim of the article is to present the aspect of organisational climate in agile development teams working remotely compared to their stationary work. Methodology: The study was conducted using author own personally designed assessment questionnaire among ten programming teams using agile software development methodology. The number of members of the analysed teams varies from four to eight. This paper compares changes in each dimension of the organisational climate that have occurred in teams after switching to remote work. Using Cohen's d statistic, it determines the magnitude of the impact of these changes. Findings: The article is an attempt to answer which elements (dimensions) of the organisational climate, in what direction (positive vs negative) and to what extent (size effect) is remote work influencing in the context of agile software development teams. Value: Such knowledge will allow appropriate modeling of organisational climate factors, thus affecting performance and the well-being of team members. This is the first step to verify, whether the previous research about the impact of the organisational climate on agile development teams still applies to those teams working remotely.

Keywords: telework, remote work, organisational climate, agile software development, work organisation.

1. Introduction

The aim of the article is to present the aspect of organisational climate in agile development teams working remotely. It is known intuitively that it has changed compared to the stationary work of these teams, but it is difficult to determine how and what elements are going through the change.

Remote work (or telework) is not a new kind of work development, especially in the IT sector. However, undoubtedly it gained in importance and popularity as a result of the Covid-19 pandemic. Currently, teleworking has become a common form of work, especially in programming teams. It is conditioned by the development of technology and relationships that change in the market. It is highly desired by the technological community and in some form (also various hybrid variants), offered by employers. It is clear, that it brings several changes which are reflected in various elements of the team's work, such as: the way of communication, cooperation, teamwork collaboration, defining tasks, accounting for duties, or appreciating and rewarding. It all adds up to the organisational climate of these teams. Therefore, remote work influences and brings about changes in the organisational climate. In turn, its conscious and regular shaping allows it to influence important aspects, not only to the management, but also to the whole company, such as efficiency, motivation, job satisfaction or a sense of security and autonomy, which allows it to retain employees.

The article, based on the analysis of the literature, available research and the author's own research, is an attempt to answer which elements (dimensions) of the organisational climate, in what direction (positive vs negative) and to what extent (size effect) is remote work influencing in the context of agile software development teams. Such knowledge will allow the leaders and managers of these teams to determine, in appropriate manner, which of these factors of the organisational climate it requires in order to take better care of the team, its performance and the well-being of its members.

2. Remote work - a historical outline

As the Cambridge Dictionary (2021) says remote work (also known as working from home, distance work or telework) is "the practice of an employee working at their home, or in some other place that is not an organisation's usual place of business". This term is of course not new but has grown in importance and popularity in 2020 due to the pandemic of Covid-19. The increase in the popularity of Google searches for this phrase (along with its varieties) amounted to over 450% in February 2020 and still remains at a relatively high level (data using Google Trends search).

The first examples of teleworking appeared in the 1960s in United States. The pace of life became astonishingly fast at one point - the USA was in a booming phase. This resulted in many office buildings and companies operating on a large scale. Remote work was a response to the pace of this development - working outside the

office, employees could avoid traffic jams and save hours commuting to work and returning home (Partner for entrepreneurship - blog, 2016).

The concept itself was first researched and described by Jack Nilles at the University of California in 1972 (JALA International, 2011). In his research, in 1979 five IBM employees were allowed to work from home as an experiment and then by 1983, the experiment was expanded to 2,000 people. They could reach each other thanks to the developing technology of organisational mainframes using personal computers, terminals using telephone lines as a network bridge and terminal emulators. He created the first definition of telework that is still used today: "a form of work organisation consisting in providing work outside the employer's organisational unit by means of electronic communication". Nilles created not only the general concept of telework, but also began to define the principles of working in this mode of work (Nilles, 1975).

In Europe, Great Britain was the first country to start hiring employees in the form of telework in the 1960s. Despite the passage of years, the United Kingdom continues to be a pioneer in employing teleworking employees (Owl Labs, 2021).

During the Information Age, many startups were founded in the houses of entrepreneurs who lacked financial resources, so remote work started to be used broadly. In 1996, the Home Work Convention and International Labour Organisation (ILO) Convention, were created to offer protection to workers who are employed in their own homes. Since the 1980s, the normalisation of remote work had been on a steady incline, also in legal aspects. By 1983 academics were beginning to experiment with online conferencing (Byrd, 2021) and in 1995 mottos like: "work is something you do, not something you travel to" or "work is what we do, not where we are" started to emerge (Woody, 1995).

In the 1990s and 2000s, remote work became facilitated by many developing information and communication technologies (ICT), such as collaborative software, virtual private networks, conference calling, videotelephony, internet access, cloud computing, voice over IP (VoIP) and mobile telecommunications technology, such as a Wi-Fi-equipped laptop or tablet computers. As well as smartphones and desktop computers, using software such as Zoom, Cisco Webex, Microsoft Teams, Google Meet, Slack, WhatsApp and many others.

Many researchers have written about the impact of remote work on various factors, including: well-being (Rothmann, 2008), physical and temporal separation (Lautsch et al., 2009), job satisfaction (Kelliher and Anderson, 2010), working long hours (Grant et al. 2013), autonomous ways of working (Suh and Lee, 2017), work stress (Perry et al., 2018), productivity and creativity (Hunter 2019), job satisfaction (Schall, 2019), motivation and burnout (Nyanamba et al., 2021), psychology and many others (Charalampous, 2018) as well as the impact of the Covid-19 pandemic.

In 2017, remote work in Poland was performed by 6% of employees – definitely less than in Denmark or Sweden, where work in this way was performed by over 15% of employees, according to a World Bank report (2019). It changed totally during the Covid-19 pandemic, where millions of workers began remote work for the first time. Cities in which the population of remote workers increased significantly were referred to as zoom towns (Rosalsky, 2020). According to an Owl Labs report (2021) 70% of employee want a hybrid or remote working style after the pandemic was over and 1 in 4 would quit their job if they could no longer work remotely after the pandemic, with an additional 19% still undecided.

This distribution is completely different in the IT industry, where remote work is much more popular – 61% in Europe (Jarzabek, 2022). This industry technologically - due to its specification - has the appropriate tools for remote work, but also struggles with the deficit of specialised employees. This kind of work significantly facilitates the employment of IT specialists, regardless of their place of residence and nationality (Trziszka, 2019). Nowadays, in IT companies, some form of remote work (hybrid) is becoming a standard, especially looking at major players in the market. They are also agile in a form of work.

3. Organisational climate

Organisational climate is a difficult concept to define because it is most often identified with the subjective feeling and perception of the atmosphere prevailing in any given organisational unit, which affects people (Dessler and Turner, 1992). It is widely understood as a set of norms characteristic for an enterprise that condition the behavior of employees and is a result of objectively functioning organisational processes and subjective feelings (Wereda et al., 2016). Therefore, in the literature on the subject, this concept is broadly discussed with its context in the development team that work specifically with agile methodology (see more: (Grobelna, 2019), (Grobelna, 2020), (Grobelna, 2021)).

For the purposes of this research, the author adopted the factors of the organisational climate listed and categorised them into nine groups (dimensions) by Wudarczewski (2012) in the systematic literature review (shown on Figure 1). These factors and dimensions were used in the author's measurements of the organisational climate.

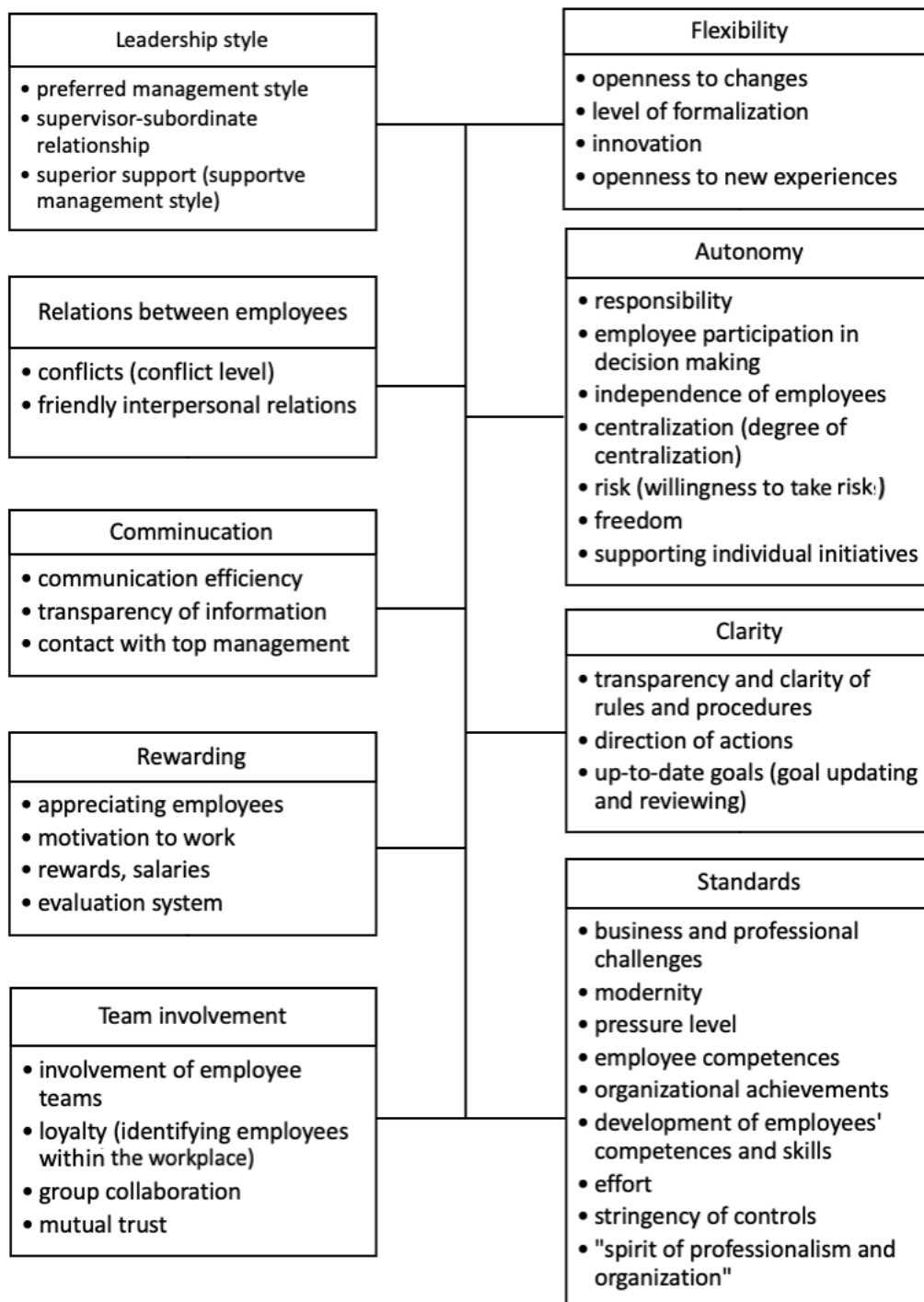


Figure 1 Dimensions and descriptive components of the organisational climate

Source: own elaboration based on Wudarczewski 2012

The question to be asked in the context of remote work and the above-mentioned factors is: are all of them are still relevant in the new context of a different way / place of work? The author, analysing the factors in each of the dimensions, believes that all of them are still applicable to agile development teams working remotely. Dimensions such as relations between employees, communication or team involvement have not lost their importance and can even be more consciously shaped in such teams. Currently, it is common, even obvious, especially in IT, to use communication and collaboration tools that allow remote teams to remain fully

connected. Thanks to this, according to the author, the organisational climate in such teams can be described and measured using the same factors and dimensions as teams working in a stationary or hybrid way.

4. Organisational climate of remote agile software development teams - research results

Empirical research was conducted in ten development teams using agile software development methodology. These teams operate in various Polish cities. The number of members of the analysed teams varies from four to eight people, depending on the team and they consist of different roles (like leader, product manager, front-end developer, back-end developer, tester, full-stack developer etc.). The elements proposed by Wudarzewski (see Figure 1) were conceptually narrowed by the author, and the most common ones were categorised into nine groups described as dimensions of the organisational climate. According to this, the research was conducted with the use of a questionnaire¹ with 5-point Likert scale², built by the author based on twenty-eight factors (those after limitation) of the organisational climate, divided and grouped into nine dimensions. These dimensions are: relations between team members, leadership style, communication, flexibility, autonomy, clarity, rewarding, team engagement and standards.

Nine teams were taken for further analysis, because unfortunately, one of the teams could not be included in the analysis due to insufficient data. In general, 63 members of the surveyed teams participated in the study. All these teams participated in previous studies, where organisational climate was measured during their stationary work (in the author's previous research, using the same research methodology). Now, as a result of the post pandemic reality, they have completely or almost completely³ switched to remote work. It is clear, that during that time, these teams are working on different products or projects and their personal composition changed. However, the teams included in that research have undergone the least significant changes (the leader remains the same, they work for the same company⁴, they identify as the same team – same name, etc.). Thanks to this, it will be possible to compare the organisational climate present in these teams during stationary work (previous research) and currently during remote work.

Table 1 presents the organisational climate in the surveyed teams working remotely, divided into dimensions. The table also includes the sum of the team members' average ratings for the "overall" assessment of the organisational climate. The higher ratings, the more liberal, open-minded, based on trust, autonomy and friendly atmosphere – extremely positive is the organisational climate in the teams. The table also shows the average scores for any given dimension obtained in all the teams surveyed, with the most positive grades marked.

Table 1 Dimensions of the organisational climate in programming teams working remotely

Team/ Dimension	Relations between team members	Leadership style	Communi- cation	Flexibility	Autonomy	Clarity	Rewarding	Team engagement	Standards	Sum of average ratings
A	3,917	4,250	4,000	4,125	4,400	4,167	3,500	3,833	3,375	104,50
B	4,6667	5,0000	3,3333	3,4167	4,0667	4,222	4,000	4,000	3,667	105,50
C	4,313	4,500	2,938	3,656	3,800	3,875	3,708	3,542	3,500	111,00
D	5,000	4,500	3,000	3,500	4,600	4,333	2,667	4,333	4,250	111,17
E	5,000	4,000	3,500	3,750	5,000	4,000	3,000	4,333	3,000	113,00
F	4,500	4,500	3,000	4,250	4,600	5,000	4,000	4,000	4,250	113,50
G	4,250	4,417	3,333	3,944	4,167	4,111	3,667	4,056	3,833	115,000
H	4,500	4,000	3,500	3,875	3,800	3,500	3,500	3,333	2,875	120,00
I	5,000	4,667	4,333	3,833	4,133	4,222	4,333	4,222	4,083	120,00
Average	4,572	4,426	3,438	3,817	4,285	4,159	3,597	3,961	3,648	

Source: own elaboration

¹ More about the construction and application of this questionnaire can be found in: (Grobelna 2021) and the questions from the questionnaire can be found in appendix 1.

² Where 1 for low occurrence of the factor and 5 for high/strong occurrence.

³ They appear in the office in exceptional situations, only "on request", like in workshops or trainings.

⁴ Especially in the case of software houses.

Analogical data is presented in Table 2 for the same teams during their stationary work in the pre-pandemic period (from previous research).

Table 2 Dimensions of the organisational climate in programming teams working stationary

Team/ Dimension	Relations between team members	Leadership style	Communication	Flexibility	Autonomy	Clarity	Rewarding	Team engagement	Standards	Sum of average ratings
A	4,6667	3,8333	4,0000	3,6667	3,9333	4,000	3,778	4,444	3,333	109,33
B	4,750	4,750	3,750	4,500	4,700	4,500	4,167	4,500	4,375	125,00
C	4,750	4,750	3,750	4,500	4,700	4,500	4,167	4,500	4,375	125,00
D	5,000	4,500	3,833	3,917	4,333	3,889	2,111	4,667	2,875	107,50
E	4,500	4,625	3,500	3,438	4,650	4,167	3,167	4,583	3,750	113,00
F	4,625	3,500	3,125	4,000	3,950	4,083	3,583	4,083	3,625	108,00
G	4,0000	3,5000	3,3750	3,6875	3,5500	3,667	3,833	3,167	3,313	99,500
H	3,300	3,200	3,100	3,550	3,600	3,200	1,867	4,133	3,750	94,00
I	4,800	4,500	4,200	3,900	4,240	4,133	4,467	4,533	3,950	119,00
Average	4,488	4,129	3,626	3,906	4,184	4,015	3,460	4,290	3,705	

Source: own elaboration (Grobelna, 2021)

Undoubtedly, remote work had an impact on all dimensions of the organisational climate in all surveyed teams. Based on this data, it is impossible to estimate whether it had a positive or negative effect. In some agile development teams, the climate has become "loosened" and liberalised (positive values changes, even very significant), while in others it has become more restrictive (changes in negative values). During both remote and stationary work, the highest rated dimension is "relations between team members" and the lowest rated are "rewarding", "communication" and "standards".

To better visualise these changes Table 3 demonstrate the differences (deltas) between the assessments for dimensions of the organisational climate in the period of remote work and stationary work for every team and the difference in average rating for every dimension. The average change for the dimension is also presented in percentage view.

Table 3 Difference in assessments of organisational climate in remote and stationary work

Team/ Dimension	Relations between team members	Leadership style	Communication	Flexibility	Autonomy	Clarity	Rewarding	Team engagement	Standards	Sum of average ratings
A	-0,750	0,417	0,000	0,458	0,467	0,167	-0,278	-0,611	0,042	-4,833
B	-0,083	0,250	-0,417	-1,083	-0,633	-0,278	-0,167	-0,500	-0,708	-19,500
C	-0,438	-0,250	-0,813	-0,844	-0,900	-0,625	-0,458	-0,958	-0,875	-14,000
D	0,000	0,000	-0,833	-0,417	0,267	0,444	0,556	-0,333	1,375	3,667
E	0,500	-0,625	0,000	0,313	0,350	-0,167	-0,167	-0,250	-0,750	0,000
F	-0,125	1,000	-0,125	0,250	0,650	0,917	0,417	-0,083	0,625	5,500
G	0,250	0,917	-0,042	0,257	0,617	0,444	-0,167	0,889	0,521	15,500
H	1,200	0,800	0,400	0,325	0,200	0,300	1,633	-0,800	-0,875	26,000
I	0,200	0,167	0,133	-0,067	-0,107	0,089	-0,133	-0,311	0,133	1,000
Average	0,084	0,297	-0,188	-0,090	0,101	0,144	0,137	-0,329	-0,057	
Average [%]	1,83%	6,72%	-5,48%	-2,35%	2,36%	3,45%	3,82%	-8,30%	-1,56%	
Cohen's d	0.3597	1.0103	-0.9443	-0.7250	0.5194	0.8354	0.2075	-1.7823	-0.2140	

Source: own elaboration

To be able to determine, whether the "effect size" (i.e., changes or fluctuations in particular dimensions), is relevant and statistically significant, Cohen's d statistics were used. It is defined as the difference between two means divided by a standard deviation for the data, calculated according to the formula:

$$d = \frac{\bar{x}_1 - \bar{x}_2}{s}$$

where:

\bar{x}_1 – average for dimensions in stationary work (Table 2),

\bar{x}_2 – average for dimensions in remote work (Table 1),

s - pooled standard deviation.

The interpretation of the effect of the size of the descriptors for magnitudes for this metric is as follows:

0 – 0.2 – slight, almost none,

0.2 – 0.5 – small,

0.5 – 0.8 – medium,

0.8 – 1.2 – large,

> 1.2 – very large.

Therefore, a negative result indicates the opposite effect of the tested factor.

Its results are also presented in the Table 3.

According to the above, the changes for all dimensions are statistically significant. The “team engagement” dimension took a very large negative (-8.3% / Cohen’s d -1.78) effect in remote work as well as “communication” – a large negative (-5.48% / Cohen’s d -0.94) effect. This is not surprising, as due to the lack of face-to-face contact, despite all new technology available, the manner and style of communication had to change and required more effort on the part of the team members. Similarly, team engagement, group collaboration and cooperation as well as all forms of team work now require changing the habits, other tools and additional effort on remote communication (without, for example, informal meetings or non-verbal communication). Also, dimensions “flexibility” and “standards” are worse – appropriately, a medium negative effect (-2.35% / Cohen’s d -0.73) and a small negative (-1.56% / Cohen’s d -0.21). The surprising result for the author is for “flexibility”. It seems to be, that during remote work, the flexibility, agility and customisable of work conditions should be better assessed, because of a less arbitrary approach, the possibility of combining work and personal life and the lack of supervision, but its change has a medium negative effect.

A significantly improved dimension is “leadership style” – a large positive effect (6.72% / Cohen’s d 1.01), which means that team leaders took great care of good relations with team members and adapted their management style to the existing situation and conditions. With less oversight and less control, the management style in those teams has become more democratic and integrative. Also, a large positive effect (3.45% / Cohen’s d 0.84) is in “clarity”. This means that the guidelines, rules and procedures were better formulated, transparent, clear and the goals were understandable and direct. It may also be related to the change in management style and the work of leaders and managers to stay in touch with employees and clearly formulate tasks and expectations. A moderate change is observed in “autonomy” – a medium positive effect (2.36% / Cohen’s d 0.52) – team members felt more independent, freedom, individual, but also responsible for their work and the tasks entrusted to them. A small positive effect is in “relations between team members” (1.83% / Cohen’s d 0.36) and “rewarding” (3.82% / Cohen’s d 0.21) dimensions.

In the author’s previous research⁵ it had been noted, that in agile software development teams desirable organisational climate is extremely positive and liberal. The more liberal, open-minded, based on trust, autonomy and friendly atmosphere (extremely positive, as expressed by the sum of averaged scores) organisational climate there was in the team, the better motivation was assessed and the higher efficiency of the team. This rule has been confirmed for teams working stationary. It is hard to say whether the correlation between organisational climate and team efficiency will be similar when working remotely. Considering the changes in the assessment of each dimension of the organisational climate, an unequivocal conclusion cannot be drawn, whether remote work had a positive or negative impact on the overall organisational climate in these teams. It is certain, that it had an impact in every area of it.

5. Conclusion and future research

Generalising the above research results and analysing documents and articles about teleworking, first of all, it should, be noted that remote work is not a new approach, but as a result of the Covid-19 pandemic has gained popularity and is used much more often with the satisfaction of both parties. Remote work is desirable and most

⁵ Read more in: (Grobelna 2019), (Grobelna 2020), (Grobelna 2021).

likely inevitable (in different forms and range) in the IT sector and programming teams. The organisational climate in teams working stationary and remotely can be defined using the same factors, so that the methodology of its measurement can be the same, which allows its comparison in both ways of working. Remote work has an impact on the organisational climate observed in programming teams. Teams using agile software development methodologies, also using the agile way approached the new form of work, using the available ICT tools and changing their approach to work in a different reality. This has an impact on each of the dimensions of the organisational climate. It cannot be clearly said whether remote work shifts the organisational climate more towards a liberal and open or a formalised and authoritarian one. Different dimensions of the organisational climate have different effects (positive and negative) as a result of remote work, although for all of them it was significant change.

Remote work has a large negative effect on “team engagement” dimension and “communication”, which is understandable due to the lack of face-to-face contact, focusing on more individual work and difficulties in contact and communication, which takes place only through tools and is devoid of non-verbal and informal layers. Quite unexpected and requiring in-depth further analysis is the medium negative impact on the dimension of “flexibility”. Remote work has a positive large effect on “leadership style” dimension and “clarity”, which is related to the work of leaders and managers to make the tasks and requirements clear, precise, and understandable and not leave the employee alone when working from home.

Future research work should include and deepen elements such as:

- the desired organisational climate in agile teams working remotely,
- the impact of the organisational climate on the work efficiency of these teams,
- does the work methodology (agile vs waterfall approach) contribute to a change in the organisational climate in remote work?
- if there is a difference in organisational climate change for remote agile development teams working for companies whose main activity is based on software development vs those teams that work for companies not from the IT sector.

It is possible that the previous research results and analyses do not apply to development teams working remotely and it should be the subject of future research.

References

- Byrd N. (2021), Online Conferences: Some History, Methods and Benefits, *Right Research, Modelling Sustainable Research Practices in the Anthropocene*, pp: 435–462.
- Cambridge Dictionary (2021), Remote work, [online], <https://dictionary.cambridge.org/pl/dictionary/english/remote-working>.
- Charalampous M. et al. (2018), Systematically reviewing remote e-workers’ well-being at work: a multidimensional approach, *European Journal of Work and Organisational Psychology*, vol. 28(1), pp:1–23.
- Dessler G. and Turner A. (1992), *Human Resource Management in Canada*, Prentice-Hall Canada Inc.
- Grant C. A., Wallace L. M. and Spurgeon P. C. (2013), An exploration of the psychological factors affecting remote e-worker’s job effectiveness, well-being and work-life balance, *Employee Relations*, vol. 35, pp: 527–546.
- Grobelna K. (2019), The impact of organisational climate on the regularity of work speed of agile software development teams, [in:] *Entrepreneurship and Management*, vol. 19(12), part I, pp. 229 – 242.
- Grobelna K. (2020), Some research results on the influence of organisational climate on the efficacy of teams using agile software development methodologies, [in:] *The Agile Enterprise in the Light of Empirical Research*, Polish Academy of Sciences, Poznan, pp. 1160 – 127.
- Grobelna K. (2021), *The Influence of Organisational Climate on the Efficacy of Teams Using Agile Software Development Methodologies*, Poznan, Publishing house of the Poznan University of Technology.
- Hunter P. (2019), Remote working in research: An increasing usage of flexible work arrangements can improve productivity and creativity, *EMBO reports*, vol. 20(1).
- JALA International, (2018), Jack Nilles, [online], <https://www.jala.com/jnmbio.php>.
- Jarząbek M. (2022), Remote and hybrid work in IT. How we work in 2022?, no *Fluff Jobs and Ringier Axel*, Springer Polska.
- Kelliher C. and Anderson D. (2010), Doing more with less? Flexible working practices and the intensification of work, *Human Relations*, no. 63, pp: 83–106.
- Lautsch B. A., Kossek E. E. and Eaton S. C. (2009), Supervisory approaches and paradoxes in managing telecommuting implementation, *Human Relations*, vol. 62, pp: 795–827.
- Nilles J. (1975), Telecommunications and organizational decentralization, *IEEE Transactions on Communications*, vol. 23(10), pp. 1142-1147.

- Nyanamba J. M., Liew J. and Li D. (2021), Parental burnout and remote learning at home during the COVID-19 pandemic: Parents' motivations for involvement, *School Psychology*.
- OWL Labs (2021), State of remote work 2021 – 5th annual edition.
- Partner for entrepreneurship - blog (2016), Telework - an outline of history, [online], <https://partnerfirm.pl/telepraca-zarys-historii/>.
- Perry S. J., Rubino C. and Hunter E. M. (2018), Stress in remote work: two studies testing the Demand-Control-Person model, *European Journal of Work and Organizational Psychology*, vol 27(5), pp: 577-593.
- Rosalsky G. (2020), Zoom Towns And The New Housing Market For The 2 Americas, NPR, [online], <https://www.npr.org/sections/money/2020/09/08/909680016/zoom-towns-and-the-new-housing-market-for-the-2-americas?t=1660746395906>.
- Rothmann S. (2008), Job satisfaction, occupational stress, burnout and work engagement as components of work-related wellbeing, *SA Journal of Industrial Psychology*, vol. 34, pp: 11–16.
- Schall M. A. (2019), The relationship between remote work and job satisfaction: The mediating roles of perceived autonomy, work-family conflict, and telecommuting intensity, doctoral dissertation, San Jose State University.
- Suh A. and Lee J. (2017), Understanding teleworkers' technostress and its influence on job satisfaction, *Internet Research*, vol. 27, pp: 140–159.
- Trziszka M. (2019), Definition of the remote work system management model in the IT industry, [in:] *Entrepreneurship and Management, Agile Commerce – adaptation of technology world changers*, vol. 19(12), part I, pp.: 243-258.
- Wereda W. et al. (2016), *Intelligent Organization (IO): Towards Contemporary Trends in the Process of Management- Selected Aspects*, Military University of Technology, Warsaw.
- Woody L. (1995), *The Underground Guide to Telecommuting*, Addison-Wesley.
- World Bank Report (2019), The changing nature of work, [online], <https://documents1.worldbank.org/curated/en/816281518818814423/2019-WDR-Report.pdf>.
- Wudarczyński G. (2012), *The genesis of organizational climate and its importance in the management of organizations*, Publishing house of the WSB University in Poznan.

Appendix 1

1. Organizational climate in development teams – survey questions

Relations between team members

1. The level of tensions (conflicts) in the team
2. Team working atmosphere

Leadership style

1. Supervisor's leadership style
2. Superior-subordinate relationship

Communication

1. Team communication efficiency
2. Contact with top management

Flexibility

1. Openness to changes in the team
2. Formalization level
3. Innovative ideas in the team
4. Team members openness to new experiences

Autonomy

1. Product responsibility as a team member
2. Participation in decision-making of team members
3. Independence of team members
4. Willingness to take risks in the team
5. Supporting individual initiatives

Clarity

1. Transparency and clarity of rules and procedures
2. Relevance and clarity (knowledge and understanding) of the team's goals
3. Purposefulness of the team's activities (whether the team's activities support the set goal)

Rewarding

1. Level of employee appreciation
2. System of evaluations, awards and promotions
3. Remuneration (in relation to the market, other employees)

Team engagement

1. Identification with the team and the workplace
2. Teamwork
3. Mutual trust in the team

Standards

1. Task difficulty level (professional challenges)
2. Modernity (attitude to new technologies) during work
3. Degree of stakeholder pressure on the team
4. "Spirit of professionalism and organization"

Quantitative Evaluation of Assessment Items of the Technology Audit Method for Research and Technology Organisations (RTOs)

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Abstract: Applied research and development (R&D) organisations strive to develop technological solutions that translate results from research and science into state-of-the-art products and services. As advanced technological capability is essential to their competitiveness, they need to be able to analyse and evaluate their technological capabilities. Hence, a tool or method is required that objectively and practically assesses the technological capability of Research and Technology Organisations (RTOs) while meeting their unique requirements. The *technology audit* enables the assessment of the technological capability and thus the technological maturity of an RTO. It focuses on the analysis of the research activities in the R&D service areas of the RTO. This allows for a comprehensive understanding of the technologies used, the research competencies, the technologies developed, and the established technology partnerships of the RTO. In this context of the development of a suitable technology audit methodology, this paper aims to describe the process of validation of assessment items for evaluating the technological maturity of applied R&D organisations. After a brief overview of the technology audit method and the assessment dimensions and items, the focus is placed on the process of its validation. An expert survey using a questionnaire was created and used to evaluate the relevance of the 11 assessment items for the technology audit instrument in the three dimensions of *Technology Base, Products & Services* and *Cooperation*, as well as the respective aspects within each assessment item. This evaluation is intended to validate the selection of the items and to specify their respective importance to ultimately optimise the process of auditing applied R&D organisations.

Keywords: Assessment Dimensions & Items, Expert Survey, Technological Capability, Technological Resources, Technology Evaluation, Technology Audit

1. Introduction

Applied Research & Development (R&D) organisations aim to develop solutions that translate the results of research and science into advanced products and services. Since advanced technological capabilities are an essential requirement for their competitiveness, they must be able to analyse and evaluate their technological capabilities in a practical and objective manner. The *technology audit*, as described in this paper, provides an eligible methodology and approach for assessing the technological maturity of an applied R&D organisation and, more broadly, Research and Technology Organisations (RTOs) through a workshop process (Rubenstein and Geisler 1991; Porter 1978). To get a comprehensive understanding of the used technologies, research competences, developed technologies, as well as the established technological partnerships, the technology audit mainly focusses on the analysis of research work within the R&D service areas of the RTO.

Over a period of several years, the technology audit method has been developed, continuously updated and improved. The development of the method so far can be traced in the following publications, which deal in detail with a broad range of literature and expert discussions (Hecklau et al. 2019a; Hecklau et al. 2019b; Hecklau et al. 2019c; Hecklau et al. 2020a, 2020b, 2020c; Hecklau et al. 2022b).

To further optimise the technology audit method, the assessment items were evaluated. Within the framework of an expert survey by means of a questionnaire, the relevance of the 11 assessment items for the technology audit tool was assessed in the three dimensions of *Technology Base, Products & Services*, and *Cooperation*, as well as the respective aspects within each assessment item. This assessment is intended to validate the selection of the items.

To begin with, the technology audit method is explained below.

2. Technology Audit Method

The technology audit method allows analysis and evaluation of the technological performance and thus the technological maturity of an RTO. A standardised procedure is used for this purpose, for which various models such as the maturity model or the model of assessment dimensions are used, as well as tools and templates. This procedure enables a structured assessment of the RTO to be audited (Hecklau et al. 2022b).

The process consists of two main parts: the *technological maturity assessment* and the *technology dialogue*. The main session constitutes the technology audit workshop, which takes place in the process step of the technological maturity assessment. Using the assessment dimensions and items described in detail in Hecklau et al. 2022a, the RTO's technology maturity level is assessed in this step. Further steps include the *preparatory session* and the *final presentation and discussion of the auditor's assessment results*. The second and optional part of the *technology dialogue* is focused on a more extensive collaboration between the technology auditor and the organisation to be audited. For this purpose, e.g., mutual competence development is targeted based on the results of the technological maturity assessment. In principle, various activities are possible in this step, including those to initiate joint research activities, such as workshops with industry representatives or joint project acquisitions. In all steps, despite any further cooperation intended, the neutrality of the auditor has to be ensured (Hecklau et al. 2022b).

3. Assessment Dimensions & Assessment Items

For the technology audit, three main dimensions for technology assessment and the corresponding assessment items are defined. The assessment dimensions of the technology audit thus comprise the *Technology Base*, *Products & Services*, and *Cooperation* of the RTO. Within the assessment dimensions, further assessment items are defined. These concretise the respective dimension and enable a targeted evaluation within the scope of the technology audit. The assessment dimensions are shown in Figure 1.

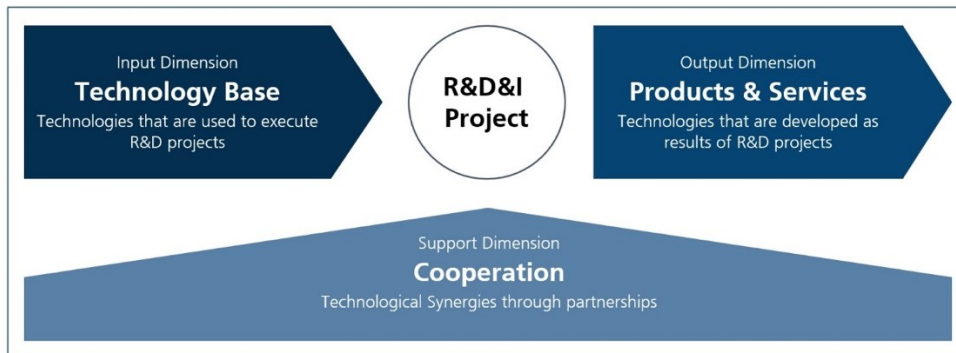


Figure 1: The 3 assessment dimensions of the technology audit

The *Technology Base* dimension focuses mainly on technologies and competencies of the RTO that are used to conduct research activities. Therefore, in line with the understanding of Technological Capability, it is also referred to as the *input dimension*. The guiding question for assessing this dimension can be formulated as follows: with the available technology base, is the RTO capable of performing state-of-the-art R&D activities in the defined technology and service areas?

Table 1 gives an overview of all assessment items of the assessment dimension *Technology Base*.

Table 1: Input Dimension: Technology Base

Input Dimension Technology Base Technologies that are used to execute R&D projects	
Technological Strategy <ul style="list-style-type: none"> • Technical Resource Planning • Human Resource Planning • Technology Benchmarking • Technology Foresight • Technology Roadmapping (external) • Awareness of new usable Technologies 	Technical Equipment / Software <ul style="list-style-type: none"> • General Equipment / Software • Specific Main Equipment / Software • Maintenance of Equipment / Software
Technical Infrastructure <ul style="list-style-type: none"> • Building(s) 	Competences <ul style="list-style-type: none"> • General Technical Competences • Specific Technical Competences • Core Competences • Formal Qualification of Staff

Input Dimension Technology Base Technologies that are used to execute R&D projects	
<ul style="list-style-type: none"> • Laboratories • Maintenance of Infrastructure • Accreditation 	<ul style="list-style-type: none"> • Competence Development / Training

Since the *Products & Services* dimension focuses mainly on the results of research, development and innovation activities and on the creation of innovative technical solutions, it can be referred to as the *output dimension*. The guiding question is as follows: By carrying out R&D activities in the defined R&D/services areas, does the RTO actually translate technologies into innovative solutions and products with clear benefits for industry?

Table 2 gives an overview of all assessment items of the assessment dimension *Products & Services*.

Table 2: Output Dimension: Products & Services

Output Dimension Products & Services Technologies that are developed as results of R&D projects	
Complexity of Research, Development and Innovation (R&D&I) Results <ul style="list-style-type: none"> • Market-Pull / Technology Push • Diversity of TRL • Multidisciplinarity • Project Volume • Run Time of the Project • Follow-Up Projects Innovative Technological Results <ul style="list-style-type: none"> • High Quality Products / Processes • High Quality Technical Services • Customised Technical Solutions • High-Quality Research Work • Technology Protection / IP 	New Technological Solutions as Products <ul style="list-style-type: none"> • Technology Trends • Technology Scouting • Technology Roadmapping (internal) • Potential Technology Spillovers

In the *Cooperation* dimension, the degree of integration of the RTO into the regional, national as well as international innovation ecosystem is analysed and evaluated. Synergistic technological collaboration helps the RTO to access complementary research competencies or partner technologies, equipment and infrastructures needed for the research work. Thus, this dimension can be referred to as the *support dimension*, which focuses on the following guiding question: Does the RTO actively engage in the innovation ecosystem and create strategic technological synergies with high-performing R&D partners to secure and expand its own field of activity?

Table 3 gives an overview of all assessment items of the assessment dimension *Cooperation*.

Table 3: Support Dimension: Cooperation

Support Dimension Cooperation Technological Synergies through partnerships	
Collaboration with Internal and External Research and Technology Organisations (RTOs) <ul style="list-style-type: none"> • Universities • Academies, Research Groups • RTOs (Research Institutes) Cooperation to Subcontractors / Third Parties <ul style="list-style-type: none"> • Integration & Usage of Technologies from Service Providers • Integration & Usage of Technologies from Customers 	Cooperation with Innovation Ecosystem <ul style="list-style-type: none"> • Start-Ups • Incubators • Accelerators • Science and Technology Parks Future Cooperation with National / International Partners <ul style="list-style-type: none"> • Partner Scouting • Competitor Analysis

The assessment items as well as the aspects and descriptions are described in detail in Hecklau et al. 2022a. Their selection is based on an extensive literature review that include the following sources: Garcia-Arreola 1996; Kaiser 2001; Hecklau et al. 2018; Phaal et al. 2004; Prahalad and Hamel 1990; Herstatt and Lettl 2001; Martinez-Vela 2016; Oberhagemann 2015; Sun and Fan 2016; Geisler 1999; Phaal et al. 2001; Kohl 2003; Coombs and Bierly 2006; Labuschagne and Brent 2006; Rush et al. 2007; Lau et al. 2010; Chen and Zhao 2012; Macchi and Fumagalli 2013; Liu and Jiang 2016; Chakravarty et al. 2013; Zhou et al. 2016; Gökalp et al. 2007; Ravichandran 2017; Lee et al. 2018; Salisu and Abu Bakar 2020; Wu et al. 2020; Hassan et al. 2021.

For the evaluation, a standardised technological maturity model is used, consisting of 5 different levels, starting with maturity level 1 – minimal technological maturity – and ending with the highest maturity level 5 – very high technological maturity. The purpose of the application of this model is to enable the most objective and standardised assessment result possible, allowing comparability across different RTOs. The technology maturity model is described in detail in Hecklau et al. 2022b.

The generic technological maturity model is visualised in the following figure.

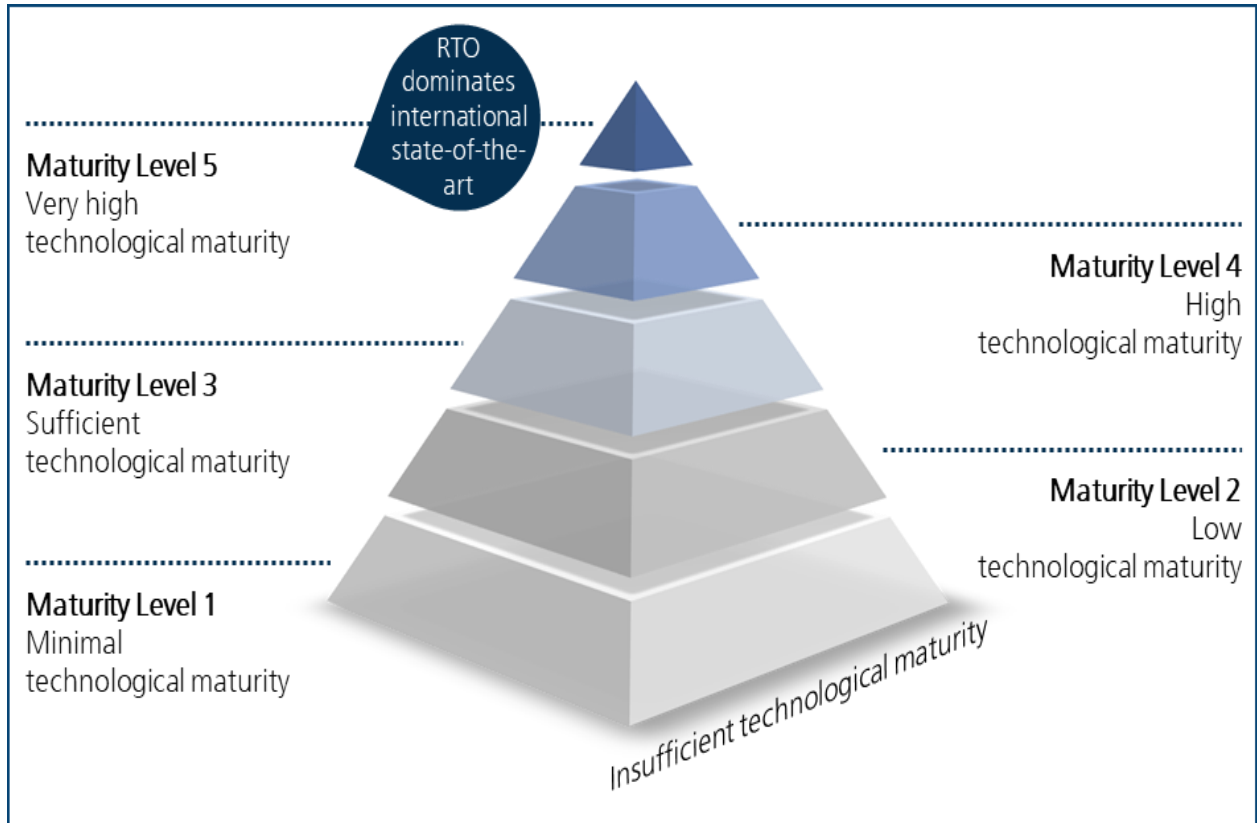


Figure 2: Technology maturity model

4. Validation of Assessment Dimensions & Assessment Items

For the quantitative evaluation of the technology audit method, a survey was created. Here, the relevance of the individual assessment items, as well as each individual aspect of the assessment items for the technology audit could be rated on a scale from 1 (very low relevance) to 5 (very high relevance). The goal was to remove assessment items with an average rating below 3 from the final set because their relevance was too low. All assessment items that were rated with at least 3 (medium relevance) by the experts were considered validated. The following expert groups were consulted:

- **13 method experts:** experts who have many years of experience, particularly in creating management methods and tools. These include experts from Fraunhofer IPK's Corporate Management department and experts from the headquarters of the SENAI network of 26 innovation institutes in Brazil.
- **11 application experts:** experts who have experience in applying management methods and tools. Experts from 8 different Fraunhofer institutes (IST, FOKUS, IGB, IPA, ICT, IZM, IML, IWU), who had applied the prototype of the technology audit in RTOs in Brazil, were surveyed.

4.1 Results of the expert survey

The detailed analysis of the expert survey shows that method and application experts rated the assessment items very similarly. The application experts who already have experience in using the prototype of the technology audit tended to rate the relevance of the assessment items somewhat lower.

Regarding the evaluation of the four assessment items of the dimension *Technology Base*, the item *Competences* was evaluated as the most important one. It is considered a very relevant element for the technology audit.

Technology Strategy was also rated similarly high. *Technical Infrastructure* and *Technical Equipment / Software* were rated less highly in comparison, but they still have a high relevance. The results of the expert survey in the *Technology Base* dimension are summarised in Figure 3.

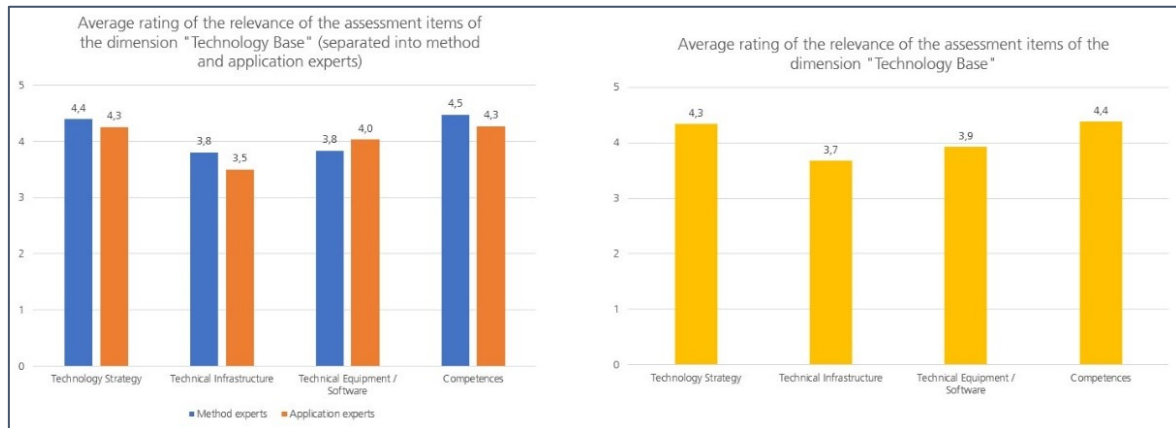


Figure 3: Results of the expert survey of the "Technology Base" dimension

In the *Products & Services* dimension, the item *Innovative Technological Results* in particular was rated high and thus as very relevant. In comparison, the assessment items *Complexity of R&D&I Results* and *New Technological Solutions as Products* were rated slightly lower, but well above the threshold of 3. The assessment results for the *Products & Services* dimension are shown in Figure 4 below.

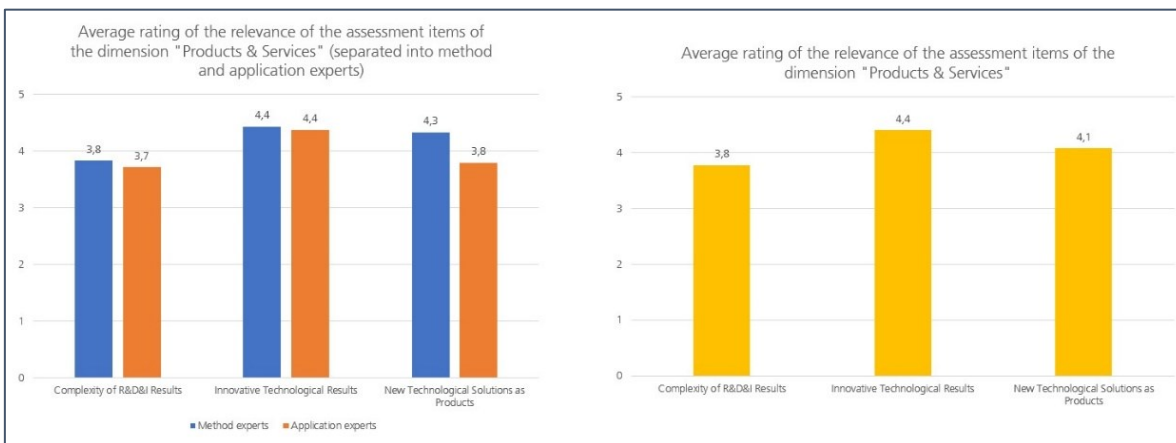


Figure 4: Results of the expert survey of the "Products & Services" dimension

The assessment items of the *Cooperation* dimension were rated lower on average and thus less relevant for consideration within the technology audit than the items of the other two dimensions. Only *Collaboration with Internal and External Research and Technology Organisations (RTOs)* was rated comparably high. *Cooperation to Subcontractors / Third Parties*, *Cooperation with Innovation Ecosystem*, and *Future Cooperation with National / International Partners* were rated lower, but above the threshold of 3 and are therefore also considered relevant for the technology audit. The expert survey results in the *Cooperation* dimension are compiled in Figure 5.

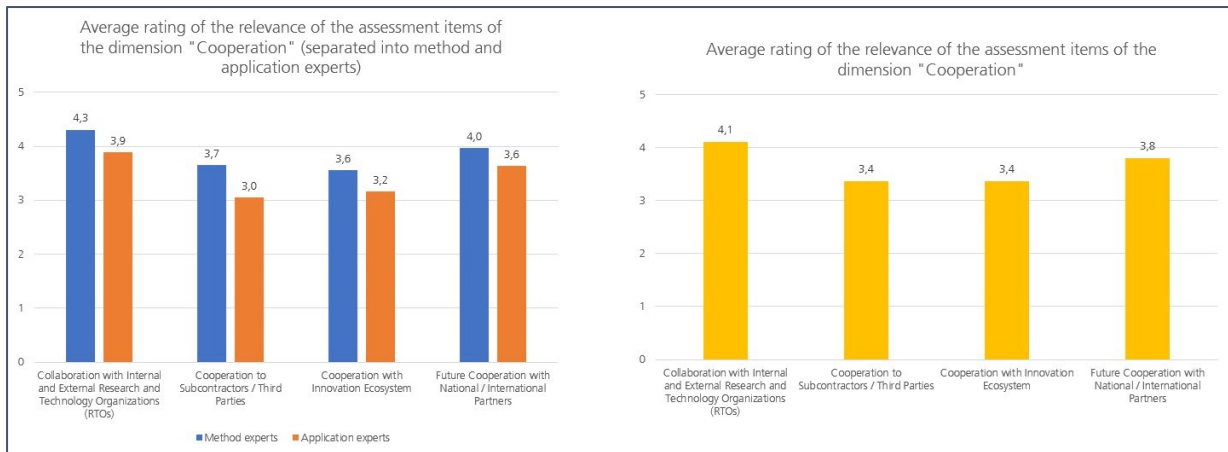


Figure 5: Results of the expert survey of the “Cooperation” dimension

The evaluation of the expert survey shows that all assessment items in the three assessment dimensions were rated by both groups of experts with at least 3 and thus as relevant for the technology audit tool. Accordingly, no assessment item was removed from the final set (short list). All eleven assessment items listed are thus considered validated.

The final set of eleven assessment items including all aspects in the three dimensions, which forms the basis for the auditor's evaluation of the RTO during the technology audit, is shown in Figure 6.

Input Dimension Technology Base Technologies that are used to execute R&D projects	Output Dimension Products & Services Technologies that are developed as results of R&D projects	Support Dimension Cooperation Technological Synergies through partnerships
<p>Technological Strategy</p> <ul style="list-style-type: none"> • Technical Resource Planning • Human Resource Planning • Technology Benchmarking • Technology Foresight • Technology Roadmapping (external) • Awareness of new usable Technologies <p>Technical Infrastructure</p> <ul style="list-style-type: none"> • Building(s) • Laboratories • Maintenance of Infrastructure • Accreditation <p>Technical Equipment / Software</p> <ul style="list-style-type: none"> • General Equipment / Software • Specific Main Equipment / Software • Maintenance of Equipment / Software <p>Competences</p> <ul style="list-style-type: none"> • General Technical Competences • Specific Technical Competences • Core Competences • Formal Qualification of Staff • Competence Development / Training 	<p>Complexity of R&D&I Results</p> <ul style="list-style-type: none"> • Market-Pull / Technology Push • Diversity of TRL • Multidisciplinarity • Project Volume • Run Time of the Project • Follow-Up Projects <p>Innovative Technological Results</p> <ul style="list-style-type: none"> • High Quality Products / Processes • High Quality Technical Services • Customized Technical Solutions • High-Quality Research Work • Technology Protection / IP <p>New Technological Solutions as Products</p> <ul style="list-style-type: none"> • Technology Trends • Technology Scouting • Technology Roadmapping (internal) • Potential Technology Spillovers 	<p>Collaboration with Internal and External Research and Technology Organizations (RTOs)</p> <ul style="list-style-type: none"> • Universities • Academies, Research Groups • RTOs (Research Institutes) <p>Cooperation to Subcontractors / Third Parties</p> <ul style="list-style-type: none"> • Integration & Usage of Technologies from Service Providers <p>Cooperation with Innovation Ecosystem</p> <ul style="list-style-type: none"> • Start-Ups • Incubators • Accelerators • Science and Technology Parks <p>Future Cooperation with National / International Partners</p> <ul style="list-style-type: none"> • Partner Scouting • Competitor Analysis

Figure 6: Validated list of assessment items including sub-aspects of the technology audit

The three highest rated aspects from this validated list, which therefore deserve special emphasis, are *Core Competences* (4.7), *Human Resource Planning* (4.5), and *Collaboration with RTOs* (4.4). The technological *Core Competences* represent bundles of technologies and capabilities with a concrete application reference (e.g. set of technological business areas) which, detached from concrete product and market constellations, lead to a decisive competitive advantage through superior customer benefits (RTO's unique selling proposition basis). Core competences should be valuable, rare, difficult for competitors to imitate and not substitutable by other competences. *Human resource planning* includes effective attraction, recruitment, continuous human resource development and retention management within the RTO. The aspect *Collaboration with RTOs* includes the provision of complementary joint research results and the development of high-level innovative solutions through synergistic collaboration with other Research and Technology Organisations.

5. Summary & Outlook

The assessment dimensions, their items and respective aspects form the central categories of the technology audit. Therefore, their selection is of integral importance for the audit method. The quantitative analysis, in

which 13 method experts and 11 application experts were interviewed using a questionnaire, confirmed this selection of 11 assessment items.

The method evaluation was carried out with the aim of validating and, if necessary, optimising the method. Even though some of the items were considered more significant than others, all items were rated as relevant by the 24 experts who participated in the validation process. Based on this finding that the assessment items are consistently highly important, all assessment items could be validated. Accordingly, there is no need to adjust the set of items. The technology audit method should therefore continue to evaluate RTOs on their performance in these categories to ensure a comprehensive evaluation.

References

- Chakravarty, Anindita; Grewal, Rajdeep; Sambamurthy V. (2013): Information Technology Competencies, Organisational Agility, and Firm Performance: Enabling and Facilitating Roles. In *Information Systems Research* (24), pp. 976–997.
- Chen, Xi; Zhao, Shuming (2012): Research on the evaluation model of Chinese enterprises' technological innovation system. From a perspective of complex system. In *Chinese Management Studies* 6 (1), pp. 65–77. DOI: 10.1108/17506141211213735.
- Coombs, J. E.; Bierly, P. E. (2006): Measuring technological capability and performance. In *R & D Management* (36), pp. 421–438.
- Garcia-Arreola, Javier (1996): Technology Effectiveness Audit Model (TEAM): A Framework for Technology Auditing. Dissertation. University of Miami, Miami, Florida.
- Geisler, Eliezer (1999): The metrics of technology evaluation: where we stand and where we should go from here. Illinois Institute of Technology, Chicago, Illinois.
- Gökalp, Ebru; Sener, Umut; Eren, P. Erhan (2007): Development of an Assessment Model for Industry 4.0: Industry 4.0-MM. In *SPICE*, pp. 128–142.
- Hassan, Noor Aishah; Zailani, Suhaiza; Rahman, Muhammad Khalilur (2021): Impact of integrated audit management effectiveness on business sustainability in manufacturing firms. In *MRR* 44 (12), pp. 1599–1622. DOI: 10.1108/MRR-10-2020-0658.
- Hecklau, Fabian; Kidschun, Florian; Kohl, Holger (2022a): Assessment Dimensions and Items for the Evaluation of the Technological Maturity of Applied R&D Organizations. In *ECIE* 17 (1), pp. 266–274. DOI: 10.34190/ecie.17.1.670.
- Hecklau, Fabian; Kidschun, Florian; Kohl, Holger (2022b): Technology Audit: Procedure for the Assessment of the Technological Maturity of Applied R&D Organizations. In Manuel Au-Yong-Oliveira, Carlos Costa (Eds.): Proceedings of the 21st European Conference on Research Methodology for Business and Management Studies. A Conference hosted by University of Aveiro Portugal, 2-3 June 2022. Reading, U.K.: Academic Conferences International Limited.
- Hecklau, Fabian; Kidschun, Florian; Kohl, Holger; Tominaj, Sokol (2019a): Requirements for a Methodology for the Analysis and Assessment of Technological Capability in Research and Technology Organizations. In Anabela Mesquita, Paulino Silva (Eds.): Proceedings of the 15th European Conference on Management, Leadership and Governance ECMLG 2019. [S.l.]: ACPI, pp. 159–168.
- Hecklau, Fabian; Kidschun, Florian; Kohl, Holger; Tominaj, Sokol (2020a): Analyzing the Role of Research and Technology Organizations (RTOs) in National Innovation Systems (NIS). In: Proceedings of 16th European Conference on Management Leadership and Governance (ECMLG).
- Hecklau, Fabian; Kidschun, Florian; Kohl, Holger; Tominaj, Sokol (2020b): Generic Process Model for the Structured Analysis of Methods. A Method Engineering Approach for the Analysis of RTO Capability Methodologies. In Manuel Au-Yong Oliveira, Carlos Costa (Eds.): Proceedings of the 19th European Conference on Research Methodology for Business and Management Studies (ECRM). A virtual conference hosted by University of Aveiro, Portugal: Academic Conferences and Publishing International (ACPI).
- Hecklau, Fabian; Kidschun, Florian; Kohl, Holger; Tominaj, Sokol (2020c): Structured Analysis of Methodologies for the Assessment of the Technological Capability of RTOs – Using a Method Engineering Approach. In: Proceedings of 15th European Conference on Innovation and Entrepreneurship (ECIE).
- Hecklau, Fabian; Kidschun, Florian; Tominaj, Sokol; Kohl, Holger (2019b): Review of Methodologies for the Assessment of the Technological Capability of RTOs. In Zsolt János Viharos, Lorenzo Ciani (Eds.): Proceedings of 16th IMEKO TC10 Conference “Testing, Diagnostics & Inspection as a comprehensive value chain for Quality & Safety”, pp. 66–70.
- Hecklau, Fabian; Kidschun, Florian; Will, Markus; Kohl, Holger; Prim, Marcelo Fabricio; Pavim, Alberto Xavier; Oliveira, José Eduardo (2019c): Application Example: Assessment of the Technological Maturity of Brazilian Innovation Institutes. In Pabafiotis Liargovas (Ed.): Proceedings of the 14th European Conference on Innovation and Entrepreneurship ECIE 2019, Kalamata, Greece, 19th -20th September 2019. [S. l.]: Academic Conferences and Publishing International (ACPI) (Proceedings of the ... European conference on entrepreneurship and innovation (Print)), pp. 363–371.
- Hecklau, Fabian; Orth, Ronald; Kidschun, Florian; Nick, Gábor (2018): The Four-Step Approach for the Creation of the HR Concept for the EPIC Centre of Excellence in Production Informatics and Control (EPIC CoE). In Benny M. E. de Waal, Pascal Ravesteijn (Eds.): Proceedings of the 14th European Conference on Management, Leadership and Governance, ECMLG 2018. Hosted by HU University of Applied Sciences, Utrecht, Netherlands, 18-19 October 2018. Reading, U.K.: Academic Conferences and Publishing International Limited, pp. 381–389.

- Herstatt, Cornelius; Lettl, Christopher (2001): Management von technologiegetriebenen Entwicklungsprojekten. In Oliver Gassmann, Carmen Kobe, Eugen Voit (Eds.): High-Risk-Projekte. Berlin, Heidelberg: Springer Berlin Heidelberg, pp. 109–131.
- Kaiser, Stephan (2001): Entwicklung von Humanressourcen. Eine ressourcen- und lernorientierte Perspektive. Zugl.: Eichstätt, Univ., Diss., 2001. 1. Aufl. Wiesbaden: Springer Fachmedien; Gabler (Gabler-Edition Wissenschaft Schriften zur Unternehmensentwicklung).
- Kohl, Holger (2003): Performance of Institutes for Applied Research. In Kai Mertins (Ed.): Innovation in Indonesia. Assessment of the national innovation system and approaches for improvement. Stuttgart: Fraunhofer-Informationszentrum Raum und Bau, pp. 91–112.
- Labuschagne, Carin; Brent, Alan C. (2006): An industry perspective of the completeness and relevance of a social assessment framework for project and technology management in the manufacturing sector. In *Journal of Cleaner Production*.
- Lau, Antonio K.W.; Yam, Richard C.M.; Tang, Esther P.Y. (2010): The impact of technological innovation capabilities on innovation performance. An empirical study in Hong Kong. In *Journal of Science and Technology Policy in China* 1 (2), pp. 163–186. DOI: 10.1108/17585521011059893.
- Lee, Seung Hyun; Leem, Choon Seong; Bae, Dae Jung (2018): The impact of technology capability, human resources, internationalization, market resources, and customer satisfaction on annual sales growth rates of Korean software firms. In *Inf Technol Manag* 19 (3), pp. 171–184. DOI: 10.1007/s10799-018-0287-2.
- Liu, L.; Jiang, Z. (2016): Influence of technological innovation capabilities on product competitiveness. In *Industrial Management & Data Systems* (5), pp. 883–902.
- Macchi, Marco; Fumagalli, Luca (2013): A maintenance maturity assessment method for the manufacturing industry. In *Journal of Quality in Maintenance Engineering* 19 (3), pp. 295–315. DOI: 10.1108/JQME-05-2013-0027.
- Martinez-Vela, C. (2016): Benchmarking Research and Technology Organizations (RTOs): A Comparative Analysis. Massachusetts Institute of Technology (MIT). Cambridge.
- Oberhagemann, Petra (2015): KMU-Instrument und Fast Track to Innovation im EU-Förderprogramm Horizont 2020. go-Inno Fachkongress für Beraterinnen und Berater. Edited by Bundesministerium für Wirtschaft und Energie (BMWi). Nationale Kontaktstelle KMU. Berlin. Available online at https://www.innovation-beratung-foerderung.de/INNO/Redaktion/DE/Downloads/Unterlagen_go-inno/ws_kmu_po_fin.pdf?__blob=publicationFile&v=10, checked on 2/5/2019.
- Phaal, R.; Farrukh, C.J.P.; Probert, D. R. (2001): Technology management process assessment. A case study. In *Int Jnl of Op & Prod Mngmnt* 21 (8), pp. 1116–1132. DOI: 10.1108/EUM0000000005588.
- Phaal, Robert; Farrukh, Clare J.P.; Probert, David R. (2004): Technology roadmapping—A planning framework for evolution and revolution. In *Technological Forecasting and Social Change* 71 (1-2), pp. 5–26. DOI: 10.1016/S0040-1625(03)00072-6.
- Porter, J. G. (1978): Post-Audits-An Aid to Research Planning. In *Research Management* 20 (1), pp. 35–38.
- Prahalad, C. K.; Hamel, G. (1990): The Core Competence of the Corporation. In *Harvard Business Review* (3), pp. 79–91.
- Ravichandran, T. (2017): Exploring the relationships between IT competence, innovation capacity and organizational agility. In *Journal of Strategic Information Systems*, pp. 23–39.
- Rubenstein, A. H.; Geisler, E. (1991): Evaluating the Outputs and Impacts of R&D/Innovation. In *International Journal of Technology Management*, pp. 182–204.
- Rush, Howard; Bessant, John; Hobday, Mike (2007): Assessing the technological capabilities of firms: developing a policy tool. In *R & D Management* (37), pp. 221–236.
- Salisu, Yakubu; Abu Bakar, Lily Julienti (2020): Technological capability, relational capability and firms' performance. The role of learning capability. In *REGI* 27 (1), pp. 79–99. DOI: 10.1108/REGI-03-2019-0040.
- Sun, Yifei; Fan, Peilei (2016): Technology Spillover. In Douglas Richardson, Noel Castree, Michael F. Goodchild, Audrey Kobayashi, Weidong Liu, Richard A. Marston (Eds.): *International Encyclopedia of Geography: People, the Earth, Environment and Technology*. Oxford, UK: John Wiley & Sons, Ltd, pp. 1–3.
- Wu, Fei; Meng, Zhe; Mao, Hanyuan; Guan, Xujun; Sun, Shaohua (2020): Design and application of support capability evaluation system for complex system. In *J. Phys.: Conf. Ser.* 1654 (1), pp. 1–5. DOI: 10.1088/1742-6596/1654/1/012078.
- Zhou, Fu-li; Wang, Xu; Lin, Yun; He, Yan-dong; Wu, Nan (2016): Influence research of multi-dimensional tech-innovation behavior on tech-innovation performance. In *IJIS* 8 (2), pp. 148–160. DOI: 10.1108/IJIS-06-2016-010.

Structuring Complex or Wicked Problems: A Multimethod Approach in Practice

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Abstract: Complex or wicked problems necessarily require multidisciplinary approaches to shape the issue(s) into a structure that can lead to viable solutions. This paper presents a case in which a systematic approach was used to combine structuring methods to support a research design that intended to quantitatively relate variables which have been insufficiently defined. Misconstrued definitions of variables and the dearth or missing data are just some of the characteristics that make this problem “complex.” The scientist’s primary work in the early stages of this type of research effort is to apply a series of techniques that meaningfully define the variables, specify relevant data to support development of quantitative models, and generate and/or collect that data. The sequence of discussion in this paper is a multimethod outline for addressing complex problems. This paper begins by defining complex or wicked problems. Next, an illustrative military problem that exhibits complex characteristics is presented. Sequentially, various structuring techniques from several fields of study such as systems engineering, operations research, and computer science are discussed and applied to the problem. Activities began with a workshop to learn about the problem and provide context. This venue allowed primary stakeholders to describe the variables from their stance. During the workshop, participants conceptualized relationships among the variables. An in-depth literature review before and after the workshop informed development of theories and hypotheses about the variables and plausible connections among them. Using functional decomposition, the team broke down the variables into their fundamental components. Relational matrices and causal loop diagrams formed initial ideas for how the components may be linked. Functional decomposition syntax also led to relevant, quantifiable measures that afforded an opportunity to mathematically formulate relationships among components, thereby achieving the primary objective of the problem. Blending techniques from different disciplines and their respective structuring methods is a powerful approach for creating conditions to solve complex or wicked problems. The utility of this study is in identifying the critical properties of a complex or wicked problem and mapping suitable methods to “tame” them. The overall approach is applicable to complex problems found in industry, government, and scientific research.

Keywords: Complex and Wicked Problems, Functional Decomposition, Causal Loop Diagram, Value Modeling, Computer Simulation Experiments

1. Introduction to Complex and Wicked Problems

Certain problems exhibit characteristics that deem them complex or wicked. Bentley and Toth (2020) describe a mess as a collection of complex problems. Similarly, Gharajedaghi (2006, 131) calls a complex problem a “system of problems” or simply, a “mess.” Both terms are appropriate when describing conditions that include numerous actors with conflicting goals and views, intangible variables that bear on the problem, and a substantial number of unknowns. These characteristics directly map onto earlier descriptions from Rosenhead and Mingers (2001). Rittel and Webber (1973) explain complex problems in the same way but further describe circumstances that pose social obstacles to finding answers. The inability of participants to agree on an acceptable solution or reasonable tradeoffs are in themselves, problematic. Varying perspectives often result in conflicting information. The politics involved with having multiple stakeholders are inherently messy.

Complex or wicked problems are chaotic, filled with uncertainty, poorly structured, and have numerous unknowns, to include unknown unknowns (Bentley and Toth 2020). Rittel and Webber (1973) suggest that problems in the natural sciences are definable with solvable solutions and therefore “tame.” However, mathematical optimizers would disagree with this generalization and present non-deterministic polynomial time (NP)-hard problems as an example (Bazaraa, Jarvis, and Sherali 2004). Mitchell and Toroczka (2009) notably discuss complexity by pointing out the criticality of system size and emergent behavior. Systems engineers explain the difficulties with set-based designs in which the solution space contracts and expands throughout the design process (Whitcomb, Hernandez, and Vizzini 2019; Hernandez and Whitcomb 2018). The Systems Engineering Book of Knowledge (Adcock 2023) describes complex systems in the large number of components involved and the manner that those components are interconnected. In these descriptions, the system is abstracted into physical entities, concepts, and processes. Among these characterizations of complexity, Sheard and Mostashari’s (2010) typologies are particularly useful for this paper. Categorizing messy problems in terms of structural (size, connectivity, and architecture), dynamic (short or long term), and socio-political makeup enable analysis.

It is evident that taming wicked and complex problems into a solvable one demands a multifaceted approach (Mingers 1997). The thrust of this paper is to illustrate a multimethod process to analyze complexities of a problem and prescribe suitable structuring techniques to tame those difficult elements. It implements ideas that have been formulated by a host of researchers to deal with increasing complexities in areas that scientists and leaders wish to explore. Therefore, the author offers this application-focused paper using a military problem as a vehicle for the discussion.

2. A Study Overview

The backdrop for describing complex or wicked problems in this paper is the presentation of a realistic, military situation that is based on current conflicts. Consequently, the problem is generalized to avoid security classification issues. However, the focal point for the reader is the multimethod approach to a wicked problem.

The study of a military problem in this paper has many applications, including business practices. Relating military problems to challenges in business is not new. The business community began adopting wargaming practices since the late 1950's (Hershkovitz 2019). In business, there are situations that are so complex that traditional, linear analysis is insufficient. However, wargaming, a military technique, can help investigate such problems. (Oriesek and Schwarz 2008). As Gilad (2009) explains, business strategies are complex problems where outcomes are determined by third parties and uncontrollable factors. The marketplace is more akin to combat than some may admit. However, once competing vendors are seen as opposing forces and maneuvering people and products are equated to military operations, the similarities are quite clear. Consequently, the military problem in this paper is just a means to introduce important ideas that are applicable to business and other areas that consist of complex problems. The author leaves it to the audience to apply the concepts to other areas.

Sheard and Mostashari (2010) analyzed complex problems based on the typology that they developed. Along with this typology, the work in this paper referenced the library of problem structuring methods and OR techniques to resolve difficulties of the military problem (Mingers and Rosenhead 2004). Additionally, Sigahi and Sznelwar (2023) provided a framework for choosing methods to address complexities of the problem.

Once the complexities of the military problem were identified, specific techniques were mapped in accordance with the characteristics of the problem (Sigahi and Sznelwar 2023; Yearworth and White 2014; Sheard and Mostashari 2010). This paper further describes a step-by-step application of different techniques that results in a structured problem that is the basis for finding solutions to the research problem.

3. Relevant Studies of Existing Problem Structuring Methods

Since the 1960's, volumes of methods have been accumulated to address extremely difficult problems in a manner that enabled the interested parties to formulate assessable alternative solutions. Collectively, strategies to shape a solution space for ill-defined, multilayered problems are called problem structuring methods (PSM). Numerous disciplines have contributed to the PSM portfolio, including operations research, physics, engineering, and the social sciences. Accordingly, many researchers have documented and catalogued different PSM types and OR techniques. The following studies were particularly useful for developing the ideas in this paper.

Mingers and Rosenhead (2004) provide a comprehensive overview of PSM, including an assessment of appropriate PSM to apply for different research conditions. Their study begins with a comprehensive discussion of proven PSM and the category in which the PSM belonged, i.e., SODA (strategic options development and analysis), decision conferencing or decision analysis, and others. Their work included specific cases for which one or more types of PSM are used. However, the research problems described in the paper did not necessarily exhibit complex or wicked characteristics.

A systems point of view is important to discussing complex problems. Systems engineering is only applied for complex engineering problems. Sheard and Mostashari (2010) relate complexity science in systems engineering terms. Their work discusses complexities of a problem in parallel with typologies that are presented in this paper. Examples of each complex system showed existing design challenges. A discussion of the engineer's thoughts and activities to resolve the issue illustrated a useful sequence of systems thinking, discovery of relevant tasks, and applicable structuring technique(s). Engineers accept this evolutionary approach to complex system or system of systems development but would not typically consider the approach to be problem structuring. Unique to Sheard and Mostashari's (2010) work is a set of measures for identifying different typologies.

Case studies are valuable documentation of specific instances of successful application of PSM. The unasked and unanswered question in these cases is determining how else specific PSM could be applied to future research problems, whether or not the future problem is similar to the problem in the study. Yearworth and White (2014) attempted to address this question in their paper. Arguing that a codified process for PSM use does not exist, Yearworth and White (2014) offered a list of nine propositions or axioms to define PSM, thereby the types of problems for which it could be applied. Numerous case studies were used to test the axioms. A summary of how the PSM fits the axiom showed the axioms' utility for selecting an appropriate PSM.

Sigahi and Szelwar (2023) recognized the rise of complexity sciences and the need to systematically examine complexity-based approaches to resolve complex problems. In their paper, Sigahi and Szelwar (2023) first categorized the types of complex problems, followed by a framework to characterize various structuring strategies. While not a primary objective, their work linked different complexity-based approaches to specific complexity types. The result is a systematic process to shape complex or wicked problems.

These previous efforts to determine appropriate PSM application are the basis for tackling complex problems. This paper does not intend to develop new definitions of PSM or even their categories. The work in this paper focuses on implementing previous studies on multimethod approaches to develop a practical way to deconstruct a complex situation and apply a combined set of PSM, as well as OR techniques to produce a solvable problem.

4. An Example of a Complex Problem: Deter an Enemy from Attacking

Military campaigns are among the most chaotic environments in which to resolve issues. Although the technological enablers for organized violence have changed, the nature of war has not. The characteristics of war remain the same because *friction* in military conflicts persists as they have before and after Clausewitz coined the phrase. Watts (1996) summarizes Clausewitz's ideas about friction: missing information, myriad of uncertainties, differences between expectations and reality, intangibles that affect resources, and unpredictable behavior of leaders and subordinates when executing a plan. These messy elements of forces in combat are remarkably reminiscent of the typology of complex and wicked problems from Sheard and Mostashari (2010).

A common military scenario is the need to deter one military force (Side B) from acting contrary to the wishes of another military force (Side A). In this case, Side A wishes to deter Side B from attacking. (For a non-military context, one may imagine a company that wishes to deter another company from initiating a hostile takeover.) From Side A's viewpoint, the current situation is in terms of its operational variables (OV): 1) the legal basis to engage in combat, 2) positioning of military units and systems in time and space of the conflict area, 3) actual system capabilities that are available to the military units, and 4) information and knowledge about Side B. These domains contain near-uncountable components that change with respect to the flow of battle.

In this problem, the researcher was tasked with examining the situation between Sides A and B and quantitatively relating the OV with deterrence. This research design is experimental. The complexities of the problem are apparent when considering the definitions for the OV or in measuring the degree of deterrence, i.e., measuring how much an act does not occur. The problem is characteristically complex (Table 1).

Table 1. Map of Complexity Types to the Attack Deterrence Problem (adapted from Sheard and Mostashari 2010)

Complexity Type: Subtype	Defined Characteristics	Elements of Attack Deterrence Problem
Structural: Size	Numbers of elements, instances, types of elements	Large military forces consist of many types and numbers of organizations and weapon systems.
Structural: Connectivity	Numbers of connections, types, strength of connections	All military units are expected to interact with all other units to achieve a singular mission.
Structural: Architecture	Patterns, clustered connections, inhomogeneity, boundaries	The connections in the hierarchy of military organizations are regimented and have official, as well as non-official communication lines.
Dynamic: Short Term	Sudden rapid and frequent changes in system behavior	All military leaders make decisions necessary for their unit survival and specific mission. Thus, positions and application of weapon systems quickly change. Tactical units are much more affected by situational changes.
Dynamic: Long Term	Changes in number and types of things and relationships	The size of the unit or hierarchy of the force is more persistent in the ascension of command.
Socio-Political	Human cognitive limitations, multiple stakeholders, global context, environmental sustainability, economics	The legal basis for prosecuting a war is inherently messy, filled with human and global context, as well as the opposing force's responses. Positioning military units is based on permissions and

Complexity Type: Subtype	Defined Characteristics	Elements of Attack Deterrence Problem
		negotiations with allies. Factors that deter Side B are only truly known by Side B, thus requiring Side A to speculate.

Categorizing the types of complexity within the Attack Deterrence Problem identified critical challenges that must be overcome to deliver acceptable solutions. The tasks that emerged manifest the difficulties involved with each element of complexity. The compiled task list was the basis for a plan to structure the problem.

1. Clearly define the OV in context of the scenario,
2. Determine initial relationships among OV,
3. Identify tangible, measurable ways to change the nature of the OV,
4. Develop deterrence measures from Side B's perspective,
5. Create a bounded environment to examine OV changes and outcomes,
6. Generate and collect data that relate the OV to deterrence, and
7. Formulate mathematical models.

5. Combining Different Structuring Methods

The implication of the resultant tasks is the need to have a multidisciplinary approach. A collection of studies from scientists such as Sigahi and Sznalwar (2023), Yearworth and White (2014), Sheard and Mostashari (2010), Mingers and Rosenhead (2004), Mingers and Brocklesby (1997), Mingers (1997), Jackson (1993) and many others, provide convincing arguments that there is no generalizable approach to any single problem. Therefore, problems with complex or wicked characteristics require a blend of PSM to define a feasible solution space.

Guidance from Mingers and Rosenhead (2004) was a valuable source for selecting specific structuring techniques to mitigate the complexities in the Attack Deterrence Problem. Additionally, ideas from Sigahi and Sznalwar (2023), Rosenhead (2013), and Mingers (1997) result in Table 2 which tracks the tasks for the military problem to a PSM category. Different techniques are available within PSM and OR types. The specific methods are listed to address the task and thereby resolve the complexity characteristics. The list below was not an attempt to cover all possible PSM or techniques. The researchers selected practical techniques to address the specific task.

Table 2. Tasks to Structuring Techniques for the Attack Deterrence Problem

Task	OR and PSM Types	Technique(s)
1. Clearly define the OV in context of the scenario	SODA, Soft systems methodology (SSM), Strategic choice approach (SCA)	Workshop methodology, Policy studies; Literature reviews, Drama theory
2. Identify tangible, measurable ways to change the nature of the OV	Drama theory, Decision conferencing or analysis (DA), SD	Systems analysis, Functional decomposition, Measures development, CLD
3. Determine initial relationships among OV	SSM, Systems dynamics (SD), Visual systems model (VSM), Critical systems heuristics (CSH)	Conceptual models, Heuristics, Causal loop diagrams (CLD)
4. Develop deterrence measures from Side B's perspective	SSM, SCA, SD, CSH, DA	Policy studies, Scenario methodologies, Systems analysis, Functional decomposition, Measures development, Value modeling
5. Create a bounded environment to examine OV changes and outcomes	SCA, Robust analysis, Drama theory, Operations research (OR), Decisions science (DS)	Scenario methodologies, Wargame, Simulation, General Morphological Analysis (GMA)
6. Generate and collect data that relate the OV to deterrence	SCA, OR, DS, DA	Computer simulation, Experimentation, GMA
7. Formulate mathematical models	OR, DS, DA	Statistical methods

6. Overview of Implementing a Multimethod Approach to the Attack Deterrence Problem

Table 2 summarizes the flow of activities that the researcher followed to set conditions for the Attack Deterrence Problem. The subsequent discussions highlight the category of PSM and the specific technique(s) that the researcher applied to tame the wicked elements of the problem.

6.1 Clearly Define the OV in Context of the Scenario

Task 1 involved hosting a workshop to kick off the entire project. Participants included the research team, subject matter experts (SME), and primary stakeholders\customers. The workshop was a venue to establish clear and mutual understanding of the problem. Discussions included detailed information for the context in which the problem existed. Known facts bearing on the problem and necessary assumptions were shared with the entire group. The primary stakeholder included constraints such as the time frame, as well as military units and weapon systems that would compose Sides A and B. Prior to the workshop, researchers performed policy studies and literature reviews of the operational environment, the theory of the fight, and the baseline scenario in which Sides A and B confront each other. These outcomes are reasons for using SODA, SSM, and SCA.

6.2 Identify Tangible, Measurable Ways to Change the Nature of the OV

The researchers earlier determined that the OV were not true variables but were actually multidimensional domains. The researchers redesignated the variables as operational vectors (OV) because of their dimensionality versus the singularity that variables would suggest. Changing the nature of a domain required changing its components. The team refined descriptions of each OV: 1) Law – the legal basis to engage in combat, 2) Position – placing military units and systems in time and space throughout the conflict area, 3) Lethality – actual system capabilities that are available to the military units, and 4) Intelligence – information and knowledge about Side B. However, the researcher is still without tangible ways to control the nature of the OV. The team drew techniques from Drama theory, DA, and SD. In particular, the team used systems analysis from the OR and systems engineering catalogs. One useful approach was functional decomposition to break down the fundamental change components of the OV. OR practitioners recognize these components as essential elements of analysis.

Functional decomposition consists of asking a simple a question, “What must the system do, to accomplish its ultimate purpose?” In studying the Attack Deterrence Problem, the team independently identified four primary functions that Side A must show that it can perform, which would deter Side B: 1) Establish a legal basis to act against another force – Law, 2) Place units and weapons at advantageous locations – Positioning, 3) Defeat an aggressor – Lethality, and 4) Produce timely information for decision making – intelligence. These top-level functions overlap the descriptions of the original OV. To further breakdown each top-level function, the team again asked the simple question about each function. For instance, decomposing the functions of Intelligence resulted in the hierarchy of functions in Figure 1.

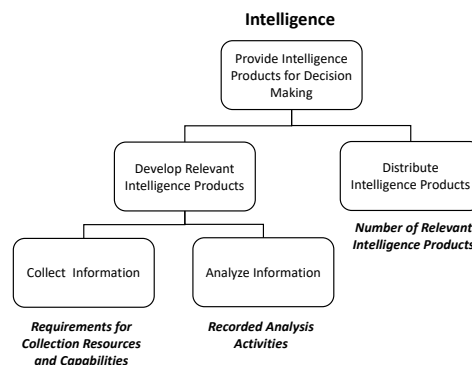


Figure 1. Functional Decomposition of Intelligence

The overarching purpose of the Intelligence OV is to “Provide Intelligence Products for Decision Making.” The functions to achieve the top purpose is to Develop and Distribute Intelligence Products. The decomposition process is iterative. At the lowest node on each branch are the elemental functions that must be conducted. Techniques from OR, DS and DA develop measures that assess achievement of the functions. These measures serve as the fundamental change components for Intelligence and are listed below the lowest node in the tree. As an example, the “Number of Relevant Intelligence Products” that Side A distributes to its forces, has a significant impact on the nature of its intelligence and decision making. The same process was used for the other OV. In total, the team identified eleven change components to represent the set of OV. From these components, the team created relational or 0/1 matrices, initial causal loop diagrams, and heuristics for potential equations.

6.3 Determine Initial Relationships among OV

The research goal for the Attack Deterrence Problem was to develop mathematical expressions among and between the OV and deterrence. The workshop was an opportunity to brainstorm these relationships. SSM, SD, VSM, and CSH consist of techniques that visually and conceptually map the connections in a system. Through systems thinking, the breakout teams created conceptual models for each OV. Heuristics for how the OV would behave explored possible interfaces that would require mathematical terms. These exercises generated initial models to answer Task 3.

Causal loop diagrams (CLD) display the interrelationship of components of a system. They are often the predecessor for developing systems dynamic models, which require mathematical relationships. Once the elements of an OV were identified, the relationships among the elements could be developed. Figure 2 is an example of a CLD for Intelligence in the military problem. From Figure 1, the components for Intelligence are Requirements for Collection Resources and Capabilities, Recorded Analysis Activities, and Number of Relevant Intelligence Products. The CLD requires a catalyst, a need that compels change in the system (Osgood 2011). In this case, a desired level of intelligence products is the driver. It implies that there is a gap in intelligence products. The relationships are directional. The symbols "S" and "O" mean that the changes between the connected components are in the same (S) or opposite (O) direction. For instance, as the gap in relevant intelligence products increases, the collection and analysis activities also increase (labeled as S). Consequently, as collection and analysis activities increase, the gap in relevant intelligence products decreased (labeled O). Additionally, the Intelligence CLD shows connections to components for the Authorities OV.

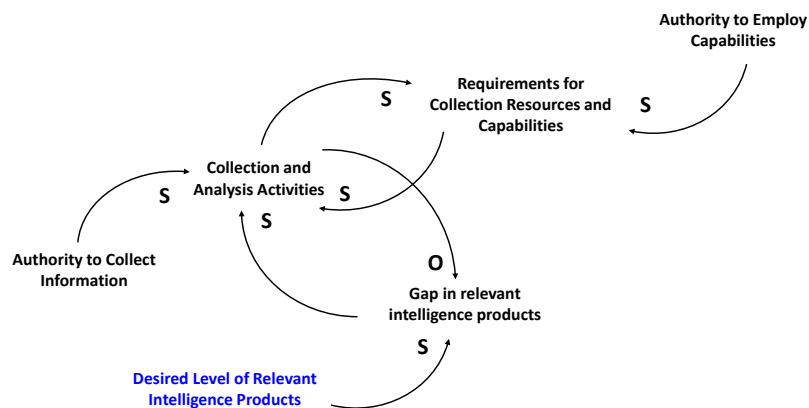


Figure 2. Causal Loop Diagram for Intelligence

The basis for these initial conceptual models was documented in the form of narrative analysis. Additionally, while the linkages between the OV models may at times be self-evident, the theory, doctrine, historical data and/or analysis must be established. Occasionally, the research team determined that operational experience was the most or only available support for the statements about the relational models. The team recorded these instances and the logic behind connecting the OV. In the process of studying the literature, new ideas, questions, hypotheses emerged that could lead to more robust solutions. Heuristics formed via the CLD are useful guides for how the equations among components might be expressed.

6.4 Develop Deterrence Measures from Side B's Perspective

A major challenge in this complex problem is to determine how to define and measure deterrence. The wicked characteristic of the problem is the need to view deterrence from Side B's perspective. A number of PSM types were employed in this task, including SSM, SCA, SD, CSH, and DA. A complete understanding of how Side B may react to Side A actions was filled with uncertainty. Scenario methodologies, policy studies, were just a few techniques to reduce speculation.

The task to develop deterrence measures was especially problematic. The stakeholder wished to understand the degree of deterrence and its relative measure(s). As previously mentioned, there is great difficulty in measuring the extent that an event does NOT occur. Therefore, deterrence must be determined beyond a YES or NO that Side B does not attack. Deep studies in policies and literature provided useful definitions of deterrence. An understanding of the specific scenario for where the conflict would occur also informed the team how to describe deterrence. Further applying the idea of functional decomposition to deterrence, the team defined

essential measures for deterrence. However, these measures have different units of measure, thereby convoluting their complete meaning relative to the other measures.

The team used value modeling to aggregate the measures into a total score for the value of attacking (Keeney 1990). The team of subject matter experts in the conflict situation examined each deterrence measure from Side B's viewpoint and developed a value model or function that converted the deterrence measure into a score from a common scale. The scale, say 0 – 40, represented Side B's desire to attack based only on the specific deterrence measure. For the purposes of this paper, the score of 40 would mean that it would be to the absolute advantage of Side B to attack. On the other hand, if the deterrence measure indicated that an attack on Side A, would result in devastating damage to Side B, Side B would likely view the value of that measure to be very low. By assigning a weight (or importance) to each deterrence measure, the team could aggregate the scores into one quantum measure for deterrence. The researcher assumed that the change components influence the behavior of the total value score (TVS), as computed from $TVS = \sum_{i=1}^k V(i)$, where $V(i)$ is the value score of the i^{th} change component.

6.5 Create a Bounded Environment to Examine OV Changes and Outcomes

This approach required knowledge about the plans of the forces involved in the conflict. The types of PSM in this phase of the work included SCA, Robust analysis, Drama theory, OR, and DS. Scenario methodologies, wargames, and GMA created different operational conditions to examine the change components and deterrence measures.

Scenario methodologies are a collection of techniques to examine future situations (von Reibnitz 1988). The team explored scenarios that established uncertainties as if they were realities, thereby driving participants to address issues that arise (Chermack 2011; Lindgren and Bandhold; 2009, Zwicky 1969). Creating scenarios demanded foundational documents about the situation, and participants with in-depth understanding of the topic being investigated, command of current strategies, the forces and processes, and potential antagonists. Figure 3 highlights required expertise from the scenario designers during each phase of scenario development (Chermack 2011). For instance, the Scenario Exploration phase requires participants to study the strengths, weaknesses, opportunities, and threats that affect organizations, decision makers, and entities in the scenario. The resultant operational environment enabled researchers to use OR techniques such as campaign analysis and wargames, as well as prepare the computer simulation database for experimentation.

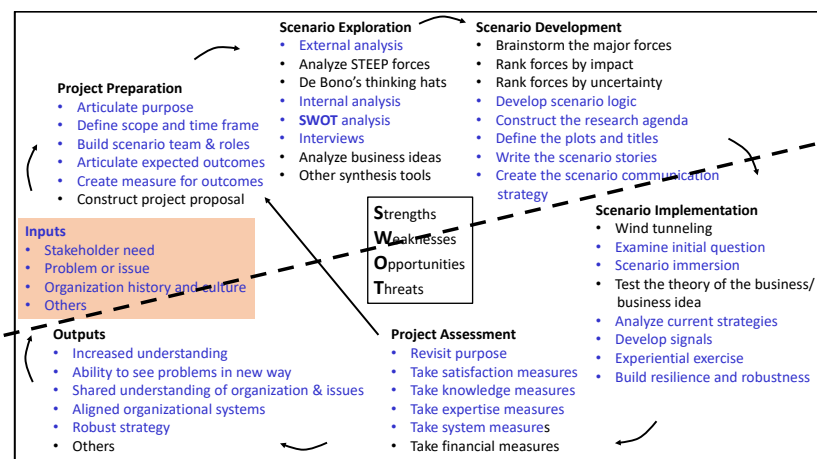


Figure 3: Scenario Planning Process (adapted from Chermack 2011).

6.6 Generate and Collect Data that Relate the OV to Deterrence

The primary objective for the Attack Deterrence Problem is to construct specific quantitative expressions for the hypothesized relational models of OV and Deterrence. To achieve this objective requires a large amount of data that did not exist in any readily available or useful form. Acquiring the data with the appropriate degree to withstand scrutiny involved techniques from SCA, DS, DA, and OR.

The research design centered on experimentation followed by statistical methods to develop the quantitative relationships among the OV and deterrence measures, including the TVS. The analytical backbone for the experiment was computer simulation of the scenario and vignettes developed in the previous task. To ensure

that the data generated from the computer simulation met the standards to use traditional statistical methods, the researchers implemented customized designs of experiments. The systematic exploration of the solution space employs the ideas of GMA as first introduced by Zwicky (1969) and expanded upon by Ritchey (2011) and many others. The use of computer modeling and simulations to implement GMA is a focus of many researchers who study structuring methods (Alvarez and Ritchey 2015; Ritchey 2006). The team has identified an appropriate simulation model and are implementing the operational scenario in the computer database.

A major difficulty when using GMA is the large quantity of combinations of scenario factors that could be studied. Even when using lattice sampling (Patterson 1954), a problem with k factors and n values for each factor, results in a total of $(n!)^{k-1}$ possible designs, each being $n \times k$ in size. This combinatorial issue is one that experimenters have pondered for many years. In recent decades, there has been tremendous progress in improving the design of experiments to examine complex problems (Lucas, et al. 2015; Kleijnen, et al. 2005). Foremost in these new experimental designs are a family of Latin hypercubes or nearly orthogonal Latin hypercubes (NOLH), which have become some of the most versatile designs for exploring problem spaces with as few experiments as possible (Song-Nan, Min-Qian, and Jin-Yu 2023; Lin, et al. 2018; Hernandez, Lucas, and Carlyle 2012; Cioppa and Lucas 2007). The orthogonality of the designs enabled the scientists to isolate the effects of major factors, as well as two-way, and three-way interactions for more complicated problems. The analysis team for the military problem used a nearly balanced, nearly orthogonal design.

6.7 Formulate Mathematical Models

The final step in addressing the Attack Deterrence Problem is to formulate the mathematical equations when data is available. For this task, the team will apply an array of OR techniques that include but not limited to regression analysis, random forest, and non-parametric trees. However, the utility of the mathematical models is in the ability to interpret the results. For instance, the general equation would be an estimate of TVS as a function of OV components, $i = 1, 2, \dots, 11$. Low TVS (undesirability to attack) corresponds with a combination of settings for each of the change components. It is the use of PSM techniques that develop narratives to explain why a specific combination of change component settings result in the low TVS. The same idea is necessary for high TVS.

The concept for using the mathematical models is for informative and possibly prescriptive reasons. The stakeholder may find utility in establishing procedures for future situations. Results could also become guidance for developing plans against similar opponents or environs. The ability to identify scenario conditions that optimize (maximize or minimize) TVS is of great importance to future planners and is one of the primary applications for experimental designs (Koehler and Owen 1996).

7. Results and Conclusions from a Blended Structuring Approach

The PSM library is a growing collection. Coupled with OR, the researcher has an arsenal of techniques to derive approaches to tame complex and wicked problems. To illustrate how a combined approach may emerge, this paper presented the Attack Deterrence Problem which examined a common military situation of one force deterring another force from attacking. The research objective to this problem was to develop quantitative models to express the relationships between operational variables and measures of deterrence. The problem presented the complexities of a wicked problem: "multiple actors, multiple perspectives, incommensurable and/or conflicting interests, important intangibles, and key uncertainties." (Mingers and Rosenhead 2004, 531) The typologies from Sheard and Mostashari (2010) and other researchers echo these characteristics.

This paper aimed to provide a sketch for dissecting and mitigating the complexities of a research problem. The discussion on managing the Attack Deterrence Problem showcased a step-by-step process and the application of different techniques from PSM and OR catalogs. The approach included a means to deconstruct the problem into complexity characteristics by using different complexity typologies, which identified specific elements of problem to tame. Understanding each element determined the necessary tasks for structuring the problem. Accordingly, the lead researcher must assemble a team familiar with each tasks, including the type of PSM and/or OR techniques to employ. The entire process is a systems thinking exercise as the researcher discovers other issues to resolve which is inherent in wicked problems (Jackson 1993).

There is no attempt in this paper to explore every PSM and OR technique or to examine in any depth how they are categorized or applied for specific problems. A host of researchers have performed much of these studies as researchers such as Jackson (1993) had recognized many years ago. Instead, the author attempts to illustrate

the utility for implementing the suggestions of researchers such as Sigahi and Szelwar (2023), Rosenhead (2013), and others that multimethod approaches are necessary to unravel complex problems. This paper offers a template for researchers who wish to tame wicked problems using a multimethod approach.

References

- Adcock, R. (2023) "Complexity." Systems Engineering Book of Knowledge. Last modified May 17, 2023. <https://sebokwiki.org/wiki/Complexity>.
- Alvarez, A. and Ritchey, T. (2015) "Application of General Morphological Analysis from Engineering Design to Policy Analysis", *Acta Morphologica Generalis*, Vol. 4, No. 1, pp. 1-40.
- Bazaraa, M.S., Jarvis, J.J., and Sherali, H.D. (2004) *Linear Programming and Network Flows 4th Edition*, John Wiley and Sons, NY.
- Bentley, J. and Toth, M. (2020) *Exploring Wicked Problems: What They Are and Why They Are Important*, Archway Publishing, Bloomington.
- Cioppa, T.M. and Lucas, T.W. (2007) "Efficient Nearly Orthogonal and Space-Filling Latin Hypercubes", *Technometrics*, Vol. 49, No. 1, 45-55.
- Chermak, T. J. (2011) *Scenario Planning in Organizations: How to Create, Use, and Assess Scenarios*, Berrett-Koehler Publishers, Inc., San Francisco.
- Gharajedaghi, J. (2006) *Systems Thinking, Managing Chaos and Complexity: A Platform for Designing Business Architecture*, Elsevier, Burlington.
- Gilad, B. (2009) *Business War Games*, Career Press, Franklin Lakes, NJ.
- Hernandez, A.S., Lucas, T.W., and Carlyle, M. (2012) "Constructing Nearly Orthogonal Latin Hypercubes for any Nonsaturated Run-Variable Combination", *ACM Transactions on Modeling and Computer Simulation*, Vol. 22, Issue 4, pp. 1–17. <https://doi.org/10.1145/2379810.2379813>.
- Hernandez, A.S. and Whitcomb, C. (2018) "A Set-Based Thinking and Engineering Reasoning Approach to Set-Based Design" Paper presented at the SNAME Maritime Convention, Providence, Rhode Island, USA, October 2018.
- Hershkovitz, S. (2019) "Wargame Business", *Naval War College Review*, Vol. 72, No. 2, pp. 67-82.
- Jackson, M.C. (1993) "The System of Systems Methodologies: A Guide to Researchers", *The Journal of the Operational Research Society*, Vol. 44, No. 2, pp. 208-209.
- Keeney, R.L. (1992) *Value-Focused Thinking: A Path to Creative Decision Making*, Harvard University Press, London.
- Kleijnen, J.P.C., Sanchez, S.M., Lucas, T.W., and Cioppa, T.M. (2005). "A User's Guide to the Brave New World of Designing Simulation Experiments", *INFORMS Journal on Computing*, 17(3): 263-289.
- Koehler, John R. and Owen, Art B. (1996) "Computer Experiments", *Handbook of Statistics*, Vol. 13, 261-308.
- Lindren, M. and Bandhold, H. (2009). *Scenario Planning: The Link between Future and Strategy*, Palgrave MacMillan, United Kingdom.
- Lin W., Fasheng S., Lin, D.K.J. and Liu, M. (2018) "Construction of Orthogonal Symmetric Latin Hypercube Designs", *Statistica Sinica*, Vol. 28, No. 3, pp. 1503-1520.
- Lucas, T.W., Kelton, D.W., Sanchez, P.J., Sanchez, S.M., and Anderson, B.L. (2015) "Changing the Paradigm: Simulation, Now a Method of First Resort", *Naval Research Logistics*, Vol. 62.
- Mingers, J. (1997) "Multi-paradigm Multimethodology", *Multimethodology: The Theory and Practice of Combining Management Science Methodologies*, Edited by John Mingers and Anthony Gill. John Wiley and Sons Ltd., New York, pp. 1-20.
- Mingers, J. and Brocklesby, J. (1997) "Multimethodology: Towards A Framework for Mixing Methodologies", *Omega*, Vol. 25, No. 5, pages 489 – 509.
- Mingers, J and Rosenhead, J. (2004) "Problem Structuring Methods in Action", *European Journal of Operational Research*, Vol. 152, pages 530 – 554.
- Mitchell, M. and Toroczkai Z. (2009) *Complexity: A Guided Tour*, Oxford University Press, Oxford, England.
- Oriesek, D.F. and Schwarz, J.O. (2008) *Business Wargaming; Securing Corporate Value*, Gower Publishing Limited, England.
- Osgood, N. (2011) "Basics of Causal Loop Diagrams", Presentation at University of Saskatchewan, Saskatoon, Saskatchewan, Canada, January 25, 2011. <https://www.cs.usask.ca/faculty/ndo885/Classes/CMPT858Spring2011/LectureSlides/>.
- Patterson, H.D. (1954). "The Errors of Lattice Sampling. Journal of the Royal Statistical Society", *Series B (Methodological)*, Vol. 16, No. 1, 140–149.
- Ritchey, T. (2006) "Problem Structuring Using Computer-Aided Morphological Analysis", *Journal of the Operations Research Society*, 57.
- Ritchey, T. (2011) "Modelling Alternative Futures with General Morphological Analysis", *World Future Review*, Spring 2011.
- Rittel, H. and Webber, M. (1973) "Dilemmas in a General Theory of Planning", *Policy Sciences*, Vol 4, pp. 155-169.
- Rosenhead, J. (2013) "Problem Structuring Methods", Advertising Response, *Encyclopedia of Operations Research*, pp. 1162-1172, The London School of Economics and Political Science, London, United Kingdom.
- Rosenhead, J. and Mingers, J. (Eds). (2001) *Rational Analysis for a Problematic World Revisited*, Wiley, Chichester.
- Sheard, S.A. and Mostashari, A. (2009) "Principles of Complex Systems for Systems Engineering", *Systems Engineering*, Vol. 2, pp. 295-311. <https://doi.org/10.1002/sys.20124>

- Sheard, S.A. and Mostashari, A. (2010), "A Complexity Typology for Systems Engineering", *Proceedings of the INCOSE International Symposium*, pp. 933-945.
- Sigahi, T.F.A.C. and Sznelwar, L.I. (2023) "Which Complexity? A Review of Typologies and a Framework Proposal for Characterizing Complexity-Based Approaches", *Kybernetes*, Vol. ahead-of-print No. ahead-of-print. <https://doi.org/10.1108/K-11-2022-1507>.
- Liu, S., Liu, M., and Yang, J. (2023) "Construction of Column-Orthogonal Designs with Two-Dimensional Stratifications", *Mathematics*, Vol. 11, No. 6, 1549; <https://doi.org/10.3390/math11061549>.
- von Reibnitz, U. (1988) *Scenario Techniques*, McGraw-Hill Publishing Co., NY.
- Watts, B.D. (1996) *Clausewitzian Friction and Future War*, National Defense University, Washington, DC.
- Whitcomb, C., Hernandez, A.S., and Vizzini, M. (2019) "Engineering Reasoning in Set-Based Design", *Naval Engineers Journal*, Vol 141, No 4, pp. 55-63.
- Yearworth, M. and White, L. (2014) "The Non-Codified Use of Problem Structuring Methods and the Need for a Generic Constitutive Definition", *European Journal of Operational Research*, Vol. 237, No. 3, 932-945.
- Zwicky, F. (1969) *Discovery, Invention, Research - Through the Morphological Approach*, The Macmillan Company, Toronto.

Design science for Small Scale Studies: Recommendations for Undergraduates and Junior Researchers

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Abstract: Design science is a research methodology that can be applied for both small scale studies at undergraduate level and for large scale application in the industry. Design science is a research methodology with several branches, with slightly different processes built around a common foundation. This paper has a focus on the branch developed by Johannesson and Perjons, and the five-phase model that is included in this branch: 1) explicate problem, 2) define requirements, 3) design and develop artefact, 4) demonstrate artefact, and 5) evaluate artefact. All these five phases must of course be carried out in a complete large-scale project in many real-world developments. However, the problem with applying a design science research project for undergraduates is that a thorough implementation of all the five phases is often too demanding for a Bachelor's or a Master's thesis. A reason for this is that several of the phases are better carried out in an iterative manner to obtain a quality result, which is time-consuming. The aim of this paper is to discuss the challenges and opportunities in applying design science for small scale studies, such as those conducted by undergraduates in their theses or by researchers new to the field. Based on this discussion, the paper concludes with a set of recommendations for how the design science methodology can be modified and applied to accommodate these smaller studies. The main recommendation is, as the principle for quality research, to delimit and to choose a specific focus that is carried out in depth. Some examples of focuses, that also are recommended by Johannesson and Perjons, are requirements and development focused design science research or evaluation focused design science research. An interesting follow-up to this position paper would be to study the application of design science in Bachelor's theses and where the emphasis is placed? Moreover, it would be interesting to investigate how design science is applied by researchers and compare if their emphasis in the design science methodology differs from that of undergraduates.

Keywords: Design science, Research methodology, Small-scale studies, Bachelor's theses, Master's theses

1. Introduction

Design science is a frequently used research methodology in engineering, computer science, information systems, or other fields where a research project aims at developing or using an artefact (Au, 2001; Gregor & Hevner, 2013; Wieringa, 2014). Design science research (DSR) has been defined as the scientific study of and creation of artefacts to solve real-world problems that are of common interest (Johannesson & Perjons, 2014). Seen as a research strategy, DSR resembles Action research in the sense that the outcomes of a study should solve an identified problem and improve existing processes. While Action research more directly addresses identified problems, DSR tries to solve problems by developing artefacts. In Action research, researchers are always involved in the investigated context, which not necessarily is the case in DSR. A strength with DSR is that it could be used both for small scale studies at undergraduate level in academia, and in large scale projects in the industry. DSR for computer science and information systems have several branches (Hevner et al., 2004; Peffers et al., 2007; Johannesson & Perjons, 2014), which have slightly different outlined processes, but are built around a common foundation. What is fundamental, and what the different branches have in common, is the idea of generating knowledge from gathering requirements, designing, developing, demonstrating, and evaluating an artefact.

This paper has chosen the branch of DSR developed by Johannesson and Perjons (2014), and to focus on how this research strategy or research framework could be applied in undergraduate projects in academia. The five-phase process that was outlined by Johannesson and Perjons (2014) is divided into the five phases of 1) explicating the problem, 2) defining requirements, 3) designing and developing an artefact, 4) demonstrating the artefact, and finally 5) evaluating the artefact (Figure 1). To obtain high-quality result in large scale projects these phases should be carried out iteratively with an incrementally improved outcome. The underlying problem, supported by the authors' experiences as researchers and higher education teachers, that motivates this study is that an iterative completion of all the five phases would be too time consuming for undergraduate projects, especially if a full-fledged artefact is developed and iteratively tested.

The aim of this position paper is to discuss the challenges and opportunities in applying design science for small scale studies, such as those conducted by undergraduates in their Bachelors' and Masters' theses or by

researchers new to the field. Based on this discussion, the paper concludes with a set of recommendations for how the design science methodology can be modified and applied to accommodate these smaller studies.

2. Design science

Design science has its roots in engineering and architecture and can be traced back to at least 1957 with the seminal work of Robert Buckminster Fuller. He was among many other things an architect, a systems theorist, a writer, a designer, and an inventor. The fundamental idea from Fuller that still is a core concept in DSR is to use scientific methods to solve human problems (Fuller, 1957). Another origin of DSR could be found in Simon (1969), even if the computer scientist and psychologist Herbert A. Simon presented his ideas as 'Design of Science' rather than Design Science (Huppatz, 2015). Simon's idea of 'The science of the artificial' moves the concept closer to the fields of computer science, software development and information systems that is the focus of this study. As pointed out by Baskerville (2008), there is no exact definition of Design science or DSR, and an explaining attempt could be, as done by Baskerville, to describe what Design science is not. On one hand DSR has been presented as a research paradigm (Hevner et al., 2004), on the other DSR has been posited as a research strategy like experiments and case studies (Oates, 2005).

Another way of outlining DSR is to use the Wittgensteinian idea of defining a phenomenon by its family resemblance (Johannesson, Perjons & Bider, 2013). The four suggested siblings in the article are 1) Branch of science, 2) Research strategy, 3) Practice research, and 4) Scientific method. Firstly, to compare Design science with Natural science as suggested by March, and Smith (1995), might be like comparing apples to blueberries. It seems to make more sense to compare Design science with Behavioural science as done by Hevner et al. (2004). Secondly, to claim a siblingship with research strategies is logical, and there are many studies that use DSR as the overall approach to answer a specific research question. Moreover, there are several similarities between DSR, Case studies and Action research that also might involve artefacts. Thirdly, the practical aspect of DSR seems rather obvious since a core principle is, like in Action research, to solve practical real-world problems. Finally, to classify DSR as a scientific method makes sense since DSR studies involve testing, observations, experiments, and other forms of systematic data collection to answer a research question.

Through the years DSR has developed and been refined into several branches (Hevner et al., 2004; Peffers et al., 2007; Kuechler & Vaishnavi, 2008; Johannesson & Perjons, 2014), that the authors all find useful for research in computer science and information systems. This paper is based upon the branch developed by Johannesson and Perjons (2014), created with the intention to support both graduate students and senior researchers to structure, conduct and present design science work. A research strategy, practical research method, or meta-framework that involves the five phases in Johannesson and Perjons (2014) design science are depicted in Figure 1 below.

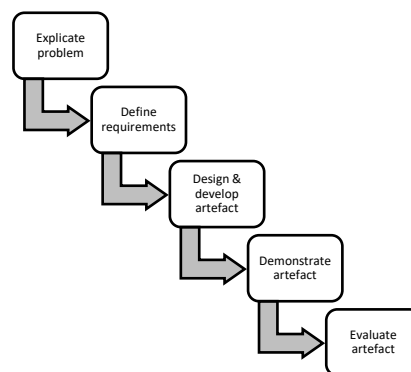


Figure 1: Summary of Johannesson and Perjons (2014) five phases in design science

3. Opportunities

Compared to other paradigms in research, design science develops or designs new artefacts (Venable, Pries-Heje & Baskerville, 2016). An important aspect of this is the practical contribution of design science studies and that the artefacts are often created to solve identified problems and improve the environment (Hevner et al., 2004; Hevner, 2007). Some contributions that design science studies can make are: artefact development can highlight need for new human activities, artefact development can make improvements to existing solutions, and design science can identify new uses for artefacts that already exists (Johannesson & Perjons, 2014).

A key activity to design science, next to that of development, is artefact evaluation (Peppers et al., 2012; Venable, Pries-Heje & Baskerville, 2016). Although design science is not the only research approach interested in evaluation (Hevner et al., 2004), its' connection to artefact development makes evaluation especially relevant for design science studies (Venable, Pries-Heje & Baskerville, 2016). The evaluation part of design science can also be an opportunity since it allows for identifying further improvements that can be carried out in artefact developments and study design (Johannesson & Perjons, 2014).

4. Challenges

Previous research has noted that design science can be demanding to conduct. For example, evaluation of the artefact that has been designed should be rigorous to demonstrate quality, efficiency, and functionality (Hevner et al., 2004; Venable, Pries-Heje & Baskerville, 2016). Further, artefact development can be demanding, where it can be difficult to determine the boundaries of the artefact (Johannesson & Perjons, 2014). Johannesson and Perjons (2014) also state that all studies carried out with the design science approach does not need to include all phases of design science and that some of the phases can be more in focus.

A common recommendation for design science is to apply an iterative research process (Hevner, 2007; Venable, Pries-Heje & Baskerville, 2016). The framework suggested by Johannesson and Perjons (2014) may resemble a waterfall model, but each phase may include several iterations. The expectation of including several phases in a design science study and carrying these out in an iterative process may contribute to the approach being perceived as demanding for small scale projects.

5. Discussion and recommendations

To work iteratively is today the dominating standard mode for development processes, even if some specific artefacts could need a waterfall like approach or a hybrid approach. As previously highlighted, although design science is often (and should when possible be) carried out with all phases of design science and in an iterative process, this is not always necessary or possible. Johannesson and Perjons (2014) have stated that research studies can focus on different phases of design science and that the phases can be carried out iterative or non-iterative. For small scale undergraduate DSR projects the overall recommendation is to choose, and focus on, a part of the five-phase process depicted in Figure 1. With the idea that a study with a narrower focus, conducted in more iterations, would have a more valuable output than the opposite. In this section, the authors discuss 4 recommendations for carrying out small scale design science studies.

5.1 Recommendation #1

Perhaps the most obvious approach to reduce the workload of a design science project is to limit the iterative process. This approach would resemble a waterfall model (Figure 2). Johannesson and Perjons (2014) have also stated that the phases of design science research can be carried out both iterative and non-iterative. However, for small scale studies, such as Bachelor's theses, this approach could still be perceived as too demanding. As highlighted in previous research, developing (Johannesson & Perjons, 2014) and evaluating (Hevner et al., 2004; Venable, Pries-Heje & Baskerville, 2016) the artefact should be rigorously conducted.

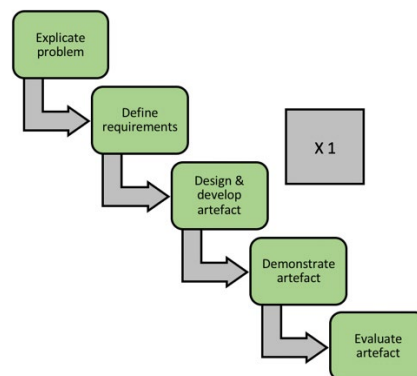


Figure 2: Non-iterative design science

If this approach to design science research is conducted in a small-scale project, the authors' recommendation is to have a clearly defined plan for the research project. This plan should preferably have a well-defined and

narrowed problem to explicate that suits a non-iterative and waterfall-like approach. Although this process would be non-iterative, it is still important that the study highlight needs in future iterations, for example in the discussion section or as suggestions for future research.

5.2 Recommendation #2

Another approach for a small-scale design science study would be to focus on the initial phases (Figure 3). Johannesson and Perjons (2014) notes that it is possible to perform both problem-focused and requirements-focused design science studies, where the problem or the requirements are carefully and rigorously examined. This approach would also exclude the more demanding parts of developing (Johannesson & Perjons, 2014) and evaluating (Hevner et al., 2004; Venable, Pries-Heje & Baskerville, 2016) an artefact. However, it should be noted that the phases of developing and evaluating artefacts are often considered key activities in design science (Peffer et al., 2012; Venable, Pries-Heje & Baskerville, 2016). To remove these phases from a research project, also small scale, would potentially call into question if 'Design science' is still an appropriate label for the study.

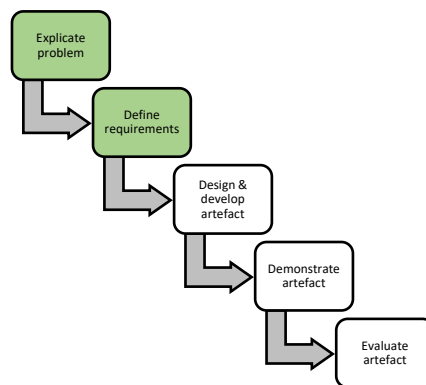


Figure 3: Problem and requirements-focused design science

If this approach to design science research is conducted in a small-scale project, the authors' recommendation is to clearly emphasize the need for future research in the discussion and/or conclusion section. The study should preferably also clearly connect the findings of the study to potential future design, development, and evaluation of artefacts. This could, for example, include a suggestion for future design. A study with this approach does not necessarily have to be labelled as 'Design science' but could instead describe itself as inspired by the design science approach.

5.3 Recommendation #3

Yet another approach for a small-scale design science study would be to instead focus on the last phases (Figure 4), with emphasis on the design phase. Johannesson and Perjons (2014) notes that design science studies with focus on development and evaluation is also a possible approach. These studies typically start with an existing specification of requirements for the artefact (Johannesson & Perjons, 2014). A strength with this approach, compared to the problem and requirements-focused approach (Figure 3), is the focus on design, development and evaluation that is often considered key activities in design science (Peffer et al., 2012; Venable, Pries-Heje & Baskerville, 2016).

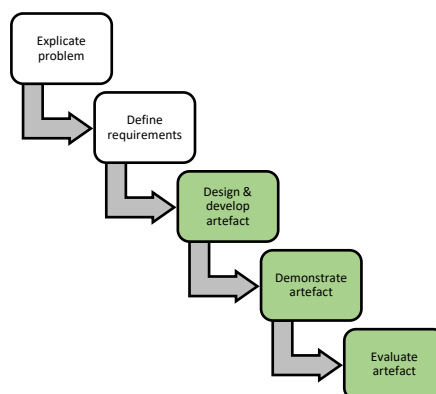


Figure 4. Design-focused design science

If this approach to design science research is conducted in a small-scale project, the authors' recommendation is to clearly state the connections between previous research (for example in the form of problem to explicate and requirements for the artefact) and the design, development and evaluation conducted in the study. This should preferably be discussed in the discussion section of a paper. A non-iterative small-scale study with this approach could further describe potential needs in future iterations, as suggestions for future research. It is also possible that the evaluation of the artefact highlights new problems or requirements that could be the endeavour for future research, which should then also be described.

5.4 Recommendation #4

Lastly, it is possible to focus on the very last phases of design science: demonstration and evaluation (Figure 5). Johannesson and Perjons (2014) highlights that some design science studies focus on the evaluation and that no new artefact is developed. This would address the challenge of design science being too demanding for small scale studies since the development part, which has been noted as one of the more demanding phases, has been cut from the project. Similar to the problem and requirements-focused approach (Figure 2), this approach could be questioned whether it is design science or not. This notion is also raised by Johannesson and Perjons (2014). However, compared to the problem and requirements-focused approach, this approach still carry out artefact evaluation which is often considered one of the key activities in design science (Peffer et al., 2012; Venable, Pries-Heje & Baskerville, 2016).

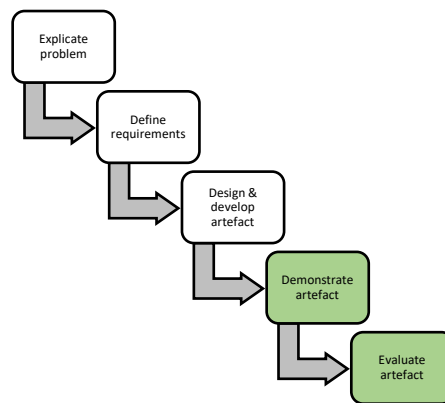


Figure 5: Evaluation-focused design science

If this approach to design science research is conducted in a small-scale project, the authors' recommendation is to clearly relate the evaluation of the artefact to future needs or re-design of the artefact, to not lose track of the 'science' in design science. This could for example be carried out critically and be used to identifying future problems and requirements, that could be investigated in future design science studies. In that sense, an evaluation-focused design science study could act as a pilot study for a more rigours and design-focused design science study in the future.

6. Conclusion

The conclusion of this position paper is that all the five phases of design science with an iterative research process are too challenging for a Bachelor's thesis, and probably for a Master's thesis as well. However, there are some potential exceptions from this. For example, theses conducted and authored by a pair of students and projects with a pre-stated and narrowed research plan, for example in collaboration with a company. In the instances where a full design science approach is deemed too challenging, it would be beneficial for both students and supervisors to choose some specific phases of the design science model to focus on. Moreover, the selected specific phases could preferably be carried out iteratively to optimize the outcome, and to relate and discuss those findings to the other phases of the design science model. This would be a good pre-training for the undergraduate students for future projects, both as a PhD student in academia or as employed in the industry.

7. Future research

An interesting next step of research would be to study the application of the design science methodology in Bachelor's theses and how the different phases were carried out. Where were the emphases placed? How many

iterations were carried out? Yet another interesting investigation would be to compare how design science is applied and described in research papers by researchers, and in theses by undergraduates. Furthermore, authors should, in a small-scale research project, split the work into fractions of the five-phase framework (Figure 1) to assess the strengths of carrying out DSR iteratively and incrementally.

References

- Au, Y. A., 2001. Design science I: The role of design science in electronic commerce research. *Communications of the Association for Information Systems*, 7(1), 1. <https://doi.org/10.17705/1CAIS.00701>
- Baskerville, R., 2008. What design science is not. *European Journal of Information Systems*, 17(5), pp.441-443. <https://doi.org/10.1057/ejis.2008.45>
- Fuller, R.B., 1957. A comprehensive anticipatory design science. *Royal Architectural Institute of Canada*, 34(8), pp.357-61.
- Gregor, S., & Hevner, A. R., 2013. Positioning and presenting design science research for maximum impact. *MIS quarterly*, pp.337-355. <https://www.jstor.org/stable/43825912>
- Hevner, A. R., 2007. A three cycle view of design science research. *Scandinavian journal of information systems*, 19(2), pp.87-92. <https://aisel.aisnet.org/sjis/vol19/iss2/4>
- Hevner A., March S. T., Park J., & Ram, S., 2004. Design science in information systems research. *MIS Quarterly* 28(1), pp.75–105. <https://doi.org/10.2307/25148625>
- Huppertz, D.J., 2015. Revisiting Herbert Simon's "Science of Design". *Design Issues*, 31(2), pp.29-40. <https://www.jstor.org/stable/43829378>
- Johannesson, P., & Perjons, E., 2014. *An introduction to design science*. Cham: Springer.
- Johannesson, P., Perjons, E. and Bider, I., 2013. What are the siblings of design science research?. In *Electronic Proceedings ADWI Workshop* (p. 118). Available at: http://www.vits.org/adwi2013/Johannesson_etal-ADWI2013.pdf (Accessed 4th of April 2023).
- Kuechler, B., & Vaishnavi, V., 2008. On theory development in design science research: anatomy of a research project. *European Journal of Information Systems*, 17(5), pp.489-504. <https://doi.org/10.1057/ejis.2008.40>
- March, S.T. and Smith, G.F., 1995. Design and natural science research on information technology. *Decision support systems*, 15(4), pp.251-266. [https://doi.org/10.1016/0167-9236\(94\)00041-2](https://doi.org/10.1016/0167-9236(94)00041-2)
- Oates, B.J., Griffiths, M. and McLean, R., 2022. *Researching information systems and computing*. Sage.
- Peffer, K., Rothenberger, M., Tuunanen, T., & Vaezi, R., 2012. Design science research evaluation. In *Design Science Research in Information Systems. Advances in Theory and Practice: 7th International Conference, DESRIST 2012, Las Vegas, NV, USA, May 14-15, 2012. Proceedings 7* (pp. 398-410). Springer Berlin Heidelberg. https://doi.org/10.1007/978-3-642-29863-9_29
- Peffer, K., Tuunanen, T., Rothenberger, M.A. and Chatterjee, S., 2007. A design science research methodology for information systems research. *Journal of management information systems*, 24(3), pp.45-77. <https://doi.org/10.2753/MIS0742-1222240302>
- Simon, H. A., 1969. *The Science of the Artificial*. The MIT Press.
- Venable, J., Pries-Heje, J., & Baskerville, R., 2016. FEDS: a framework for evaluation in design science research. *European journal of information systems*, 25, pp.77-89. <https://doi.org/10.1057/ejis.2014.36>
- Wieringa, R. J., 2014. *Design science methodology for information systems and software engineering*. Springer.

Are we There yet? Thematic Analysis, NLP, and Machine Learning for Research

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Abstract. Thematic analysis is a well-established technique for qualitative analysis which is covered in traditional research methods training. The objective of thematic analysis is to elicit themes and significant topics from discursive data such as free style discussions and semi structured or unstructured interviews or comments. The approach is laborious and time consuming and requires a significant input from researchers for identifying and coding the themes although software tools such as NVivo, T-Lab and IRaMuTeQ can aid with results presentation. Recent developments in Machine Learning (ML) and Natural Language Processing (NLP) have boosted interest in text analytics and its applications to social science research. For example, automatic topic identification using ML NLP offers valuable insights in social media analytics. However, machine learning techniques conventionally rely on large data sets to enable the algorithm to elicit themes. More recent research efforts have turned to the performance of machine learning approaches with smaller data sets.

This study aims to compare and contrast the effectiveness of Machine Learning NLP vs human generated themes using the text analytics tools NVivo, T-Lab, IRaMuTeQ, as well as the low-code ML tool KNIME for automatically eliciting themes from academic literature review in the contexts of service operations management research and semi-structured customer interviews. Results indicate that the ML NLP approach has the potential to automatically detect research themes even with small data sets, although the results vary across the different tools and are dependent on the capabilities of the built-in text analytic algorithms. In particular, T-Lab offered the best mapping of machine learning derived topics to researcher themes, and KNIME proved the most robust software, able to derive meaningful topics even with very small sample sizes. The implications for training research students are also significant as they suggest that the inclusion of ML NLP tools and algorithms in the training curriculum of social scientists may be beneficial.

Key words: Thematic Analysis, NLP, Machine Learning, Qualitative Data Analysis, Comparative Review

1. Introduction

Qualitative data analysis (QDA) methods have played a significant role in research over the past few decades (Creswell, 2014), and the tools available for such analysis have been expanding rapidly (Meyer and Avery, 2009). Nowadays, text-analytics software has emerged as a valuable resource that enhances researchers' capabilities and enables more efficient quantification of qualitative data. Among the various techniques employed, Thematic Analysis (TA) stands out as a widely utilized approach, known for its ability to identify, analyse, and report patterns or themes within data (Braun and Clark, 2006). The objective of thematic analysis is to elicit themes and significant topics from discursive data such as free style discussions and semi-structured or unstructured interviews or comments. This approach allows researchers to delve deeper into the underlying meanings and concepts present in the data, moving beyond surface-level observations and exploring the interconnectedness of ideas. By employing coding and thematic analysis techniques, researchers can uncover rich insights and patterns that contribute to a more comprehensive understanding of the research topic. However, the approach is laborious and time consuming and requires a significant input from researchers for identifying and coding the themes although software tools such as NVivo, T-Lab and IRaMuTeQ can aid with results presentation.

Recent developments in Machine Learning (ML) and Natural Language Processing (NLP) have boosted interest in text analytics and its applications to social science research. For example, evidence suggest that the addition of automatic topic identification using ML NLP from social media analytics improves the predictive power of healthcare surveillance systems (Gupta and Katarya, 2020). However, machine learning techniques conventionally rely on large data sets to enable the algorithm to elicit meaningful themes. More recent research efforts have turned to the performance of machine learning approaches with smaller data sets and have shown promising results with as few as 300 examples in supervised machine learning (Riekert, Riekert and Klein, 2021). However, the majority of adopt an exploratory approach which is handled via unsupervised ML algorithms. The identification of themes in a text using NLP is an emerging exploratory approach which works well with large data sets (Davidson *et al.*, 2021; Kim *et al.*, 2022) but limited research has explored how unsupervised text-analytics approaches fit into the traditional landscape of qualitative methods of which traditionally deal with smaller data sets (Firmin *et al.*, 2017). As a result, the application of machine learning text analytics tools in the field of education remains relatively unexplored (Spector and Ma, 2019). Given the potential for AI to

revolutionise education, the case for incorporating ML and NLP tools in the curriculum should also be considered.

To this end, this study aims to facilitate further understanding of the effectiveness of unsupervised machine learning NLP tools for theme identification with smaller data sets and the implications for inclusion of ML and NLP in the curriculum. The research examines and compares the effectiveness of the built in automatic topic identification engines of several social science software tools, namely NVivo, IRaMuTeQ, T-Lab and KNIME to human generated themes across two data sets. The data sets represent two common use cases in social science research: an academic literature review in the contexts of service operations management and semi-structured customer interviews discussing the attitudes of shoppers in a department store.

The paper starts with a brief introduction to thematic analysis, followed by brief outline of the analytical steps in a machine learning natural language processing (NLP) algorithm, before discussing the methods and data sets used in our analysis. A presentation of the analytical output from each tool is followed by a discussion of the results and conclusions are drawn as to the state of art of NLP and machine learning. Finally, recommendations for curriculum design and future research are highlighted.

2. Thematic analysis (TA)

Thematic Analysis (TA) is a QDA method used for identifying patterns or themes of meaning within qualitative data such as interview transcripts, media, focus groups based on the main themes within their research questions. The approach accommodates both small and large datasets and is versatile as it can be utilised for both theory-driven or data-driven analyses (Braun and Clarke, 2006). As pointed out by Guest, MacQueen, and Namey (2012), TA extends beyond simply counting the most frequent words or phrases in a qualitative data set but aims to identify both implicit and explicit ideas within the data and uses codes or themes to analyse and compare their co-occurrence, as well as to display relationships among them.

According to Braun and Clarke (2006) TA includes six phases: 1) Data Familiarization: requires the researcher to read the texts and generate a codebook, based on the research questions; 2) Manual Code Generation: based on the previously generated codebook and research questions; 3) Themes identification: grouping the manually generated codes; 4) Themes review: refine codes; 5) Themes naming and 6) Report. The steps are normally employed by researchers as a cycle of inductive development of themes and their subsequent inferential application to the existing data, while assessing their significance and validity (Strauss and Corbin, 1998). According to Braun and Clark (2006), TA can adopt inductive or deductive-theoretical approach in the search of the why's and how's. TA approaches are predominantly influenced by the typology proposed by Clarke et al. (2019), which highlights three key aspects: coding reliability, reflective practice, and the use of a codebook to facilitate transparency and replicability. However, despite the guidance of codebook rules, thematic analysis, can be challenging, especially for novice researchers, as they grapple with understanding the effectiveness of their coding techniques and whether they align with their research focus (Fonteyn *et al.*, 2008). The process of theme identification in traditional qualitative research methods is by default subjective and related to the experience, understanding and knowledge of the researcher, and may lead to issue with the replicability and the reliability of the analysis (Anderson *et al.*, 2019). Variations to this methodology have been suggested to attempt to minimise the subjective researcher bias (Milles and Huberman, 1994)

There is growing awareness that text analysis methods can benefit from the adoption of computer software as a support tool. For example, Hwang (2008) argues that the adoption of software during the analysis can enhance transparency and replicability by providing a structured framework for analysis as well as facilitating the organization and management of data. Consequently, it is more inductive, and data driven in comparison to TA. Furthermore, research tools can save time, particularly when working with a large dataset or collaborating in team setting. However, it is important to note that while text analysis software offers valuable support, it does not replace the need of critical thinking and researcher involvement in the analytical process (Fielding, 2002). The debate is even more pertinent with the emergence of Generative Pre-trained Transformer tools such as OpenAI's ChatGPT which has taken the research community by storm. So far, ChatGPT has demonstrated promising capabilities in generation texts in various domains, including computer code generation, text translation and interpretation (Sobania *et al.*, 2023; Tate *et al.*, 2023), Although to the best of our knowledge, ChatGPT's capabilities as a thematic identification tool have not been explored, its potential to disrupt the existing research ecosystem is significant.

3. Machine Learning (ML) and Natural Language Processing (NLP)

Machine learning approaches attempt to identify topics in a set of texts automatically, following a predetermined set of text processing algorithms. Thus topic derivation is purely data driven and independent of the specific research questions. The approaches require significant text pre-processing to reduce the dimensionality of the task (Step 1) and the deployment of ML approaches such as association and clustering, to identify common word patterns, which are then grouped into topics (Step 2).

Step 1: Pre-processing and data cleansing. The pre-processing step involves removal of punctuation, numbers, capitalisation, short and stop words such as “the”, “a” “and” as well as tokenisation, which assigns part of speech (POS) label for each word, and lemmatization, which identifies the lemma of a term by removing inflections.

The objective of the pre-processing step is to identify the set of words, referred to as a Bag of Words (BOW) that are used in the documents. The BOW may be processed further for topic identification (see Step 2), used for word frequency analysis, or presented in a word cloud.

Step 2: Word embedding (coding) and modelling using topic detection algorithms or language models, such as LDA, skip-gram or continuous bag of words (CBOW) to elicit topics or predict the next word in a sentence. The objective of this step is to encode the text (also referred to as embedding) into word vectors to enable the language models to learn the text. Language models predict and learn by calculating conditional probabilities of words occurring together, and word vectors facilitate the probability calculations. Embedding involves the representation of the text at word, sentence, paragraph or even document level into a set of vectors that can be learned by the NLP models (Mikolov *et al.*, 2013). Table 1 shows a simple representation of the sentence “I love shopping at KDS”.

Table 1. One-hot encoding for the sentence “I love shopping at KDS”

	1	2	3	4	5
I	1	0	0	0	0
love	0	1	0	0	0
shopping	0	0	1	0	0
at	0	0	0	1	0
KDS	0	0	0	0	1

Each of the words in the table are represented by their respective vectors. For example, the word “shopping” is represented by the vector {0,0,1,0,0}. One advantage of word vector presentations is that one can identify relationships between words such as “London” is to the “UK” as “Tokyo” is to “Japan” and “Paris” is to “France” to represent the relationship of capital city. See Mikolov *et al.* (2013) for a comprehensive overview.

The most popular Topic Modelling algorithm is LDA, which stands for Latent Dirichlet Allocation (Blei, Ng, and Jordan, 2003).

- *Latent* reflects that the algorithm can detect “hidden” topics. The texts are processes and the LDA algorithms identifies topics from within the texts that are not known in advance.
- *Dirichlet* stands for the Dirichlet distribution the model uses as a prior to generate document-topic and word-topic distributions.
- *Allocation* allocates the latent topics identified in the analysis to each text.

4. Method

The study adopts a comparative approach utilising two small data sets to test the automated machine learning capabilities of four text analysis software tools: NVivo, T-Lab and IRaMuTeQ and KNIME. The results compared the capacity of each tool to generate a word cloud (showing the BOW from each corpus) and thematic/topic extraction, which reflect an output from step 1 and step 2 from the machine learning process, respectively. In the context of thematic analysis, the word cloud generation corresponds to phase 1 and 2 of Braun and Clarke’s (2006) method, while the thematic/topic extraction covers phases 2 and 3.

The two data sets used for testing are two common data types that arise in social science research. The first data set consists of bibliographic entries gathered as part of a literature review using keywords in Scopus. The dataset consists of 203 highly relevant and influential publications on service operation management, between 2007

and 2020. The analysis focused on the abstract of each publication to extract the BOW and themes withing the corpus. The second data set is very small and consists of nine semi-structured interview transcripts from a convenience sample of female customers of Kingston Department store (KDS) conducted in 2005. Due to the small sample size, the interviews were initially analysed as a whole, and then structured per question as suggested by Troung (2022) to fully challenge the capabilities of each tool to handle small data. Only the themes extracted by Q2: “Why do you shop at KDS” were shown for illustrative purposes but the results were consistent across all interview questions.

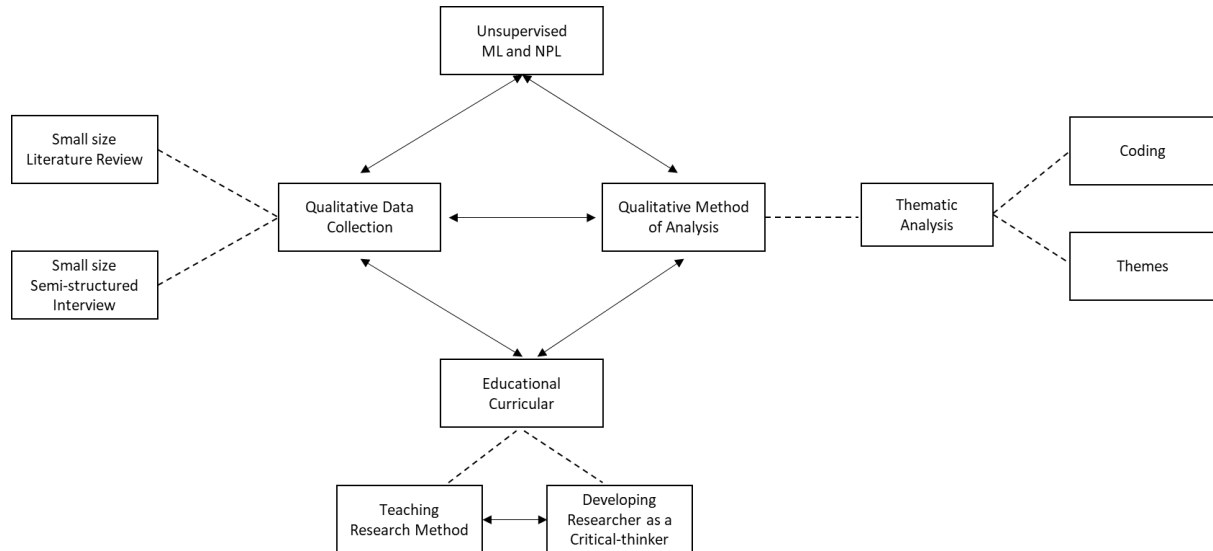


Figure 1: Mapping ML and NLP for empowering thematic analysis in educational curriculum

To ensure parity of comparison with machine learning, the capacity of NVivo, T-Lab, IRaMuTeQ and KNIME to automatically identify and group common themes, without any additional human input was tested. The word clouds were created with the top 100 most frequent words for the literature review and the 50 most common words for the interviews. The thematic analysis results were run with standard settings for each tool and were compared to the human generated themes from each data set as shown in Table 2 and Table 3 below. The coverage of human generated themes for each tool was reported and mean coverage as well as the coverage standard deviation and per theme coverage to allow for direct comparison between tools.

Table 2: Literature Review Researcher Themes and Subthemes

Themes	Sub-themes	Number	%
1.The Operation Managers and Service Strategy (TOMSS)		61	35%
	Managing Operations (MO)	30	17%
	Service Strategy (SS)	31	18%
2.Service Design and Delivery Service (SDDS)		27	17%
	Service Design (SDgn)	10	6%
	Service Delivery (SD)	17	10%
	Location and Layout (LL)	2	1%
3.Managing Service Operations (MSO)		67	39%
	Managing Capacity (MC)	7	4%
	Planning-Scheduling-Control (PSC)	8	5%
	Managing Service Inventory (MSI)	4	2%
	Managing Service Quality (MSQ)	15	9%
4.Improving Service Operations (ISO)		4	2%
	Managing Service Supply Chain (SSC)	30	17%
Reviews		14	7%

Table 3: KDS Interviews Researcher Themes and Coding Frame

N:	Coding Frame	
	Code Name	Description
Theme 1	Motivation for visiting	What drives this target segment into the store? This include various touchpoints/encounters, for example: facilities, product, service performance and the level of satisfaction/dissatisfaction of it. Sub-Themes: Convenience, Product, Experience, Facilities (such as car park, coffee shop etc.), Service performance
Theme 2	Motivation for purchasing	The ins and outs of what makes this target group buying from KDS store? What is preventing them checking out more frequently? Sub-Themes: Brands, Offers, Price, Quality of the Products, Range of the Products, Staff
Theme 3	Value for money	Not only economic value such as price, promotion but also emotional value that influence their buying decision, i.e. positive past experiences, parent value in term of their input in the know/heritage; time as value in term of easy services such as having automated check out, returns etc. and the fact that is one-stop-shop. In general value here is treated as everything that affect the benefits and cost of offerings in the personas head.
Theme 4	Sophistication	Putting their money where the brand personality's is. Is there ongoing relationship with the store or with offered best-loved brands? Is there sense of loyalty, trust and satisfaction? How these target segment identify its social status? Sub-Themes: Store Image, Designer collection, Aesthetics, Feeling important, Time (automated checkout)
Theme 5	Competitors	Other similar shops, marketplaces and online option used for purchasing any items Sub-Themes: Boutiques, Local market, Online, Similar shops, Specialist shops
Theme 6	Frequencies	Unwell important characteristics of the population's behaviour, alongside the duration of visits. Can help determin store loyalty Sub-Themes: Regular (twice or more per month), Monthly; Occasional (seasonal, special occasion-few times a year), Rare (one or two times per year)

5. Automatic Text Analytics Results

The world clouds generated for the Literature Review data by each tool are shown in Figure 2 through to Figure 5 below and the themes extracted, when possible, are shown in Figures 6 thought to Figure 9. Similarly, the world clouds generated for the whole Interview data and Q2 only from the Interview data by each tool, are shown in Figure 10 through to Figure 13 and the themes extracted, when possible, are shown in Figures 14 thought to Figure 17, respectively.

5.1 Text Analytics of Literature Reviews: Word Clouds



Figure 2: NVivo: Word Cloud Literature Review

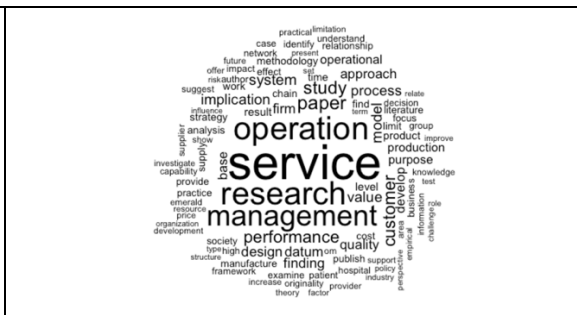


Figure 3: IRaMuTeQ: Word Cloud Literature Review

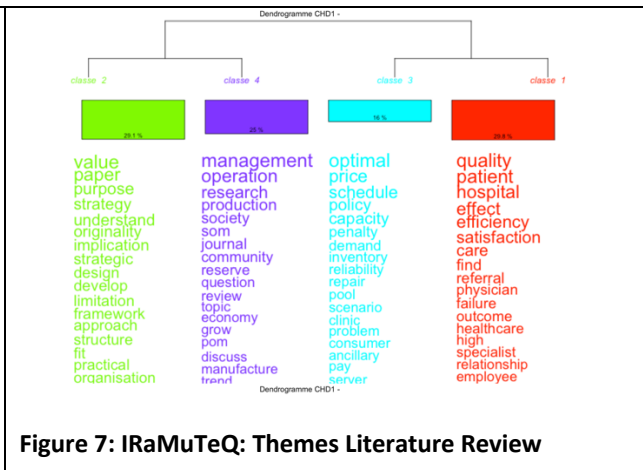
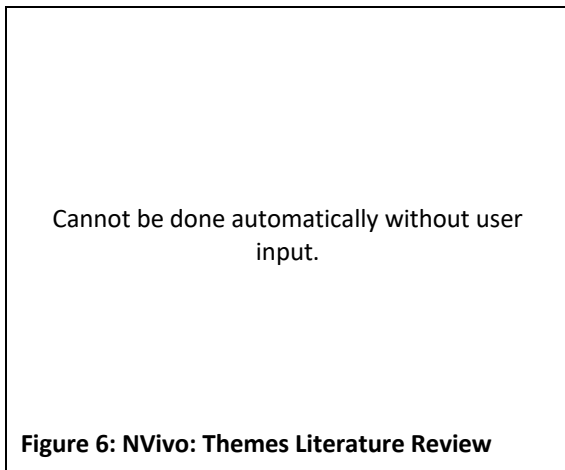


Figure 4: KNIME: Word Cloud Literature Review



Figure 5: T-Lab: Word Cloud Literature Review

5.2 Text Analytics of Literature Reviews: Themes



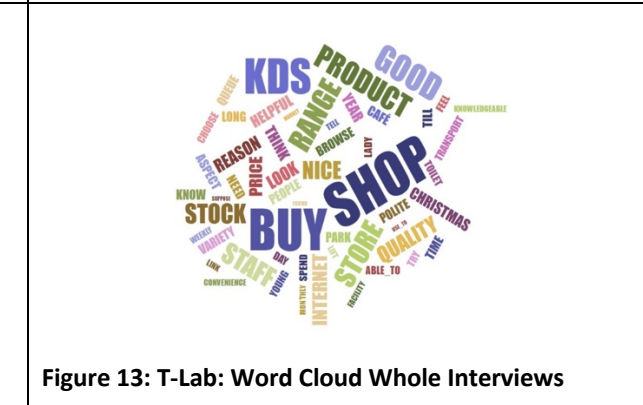
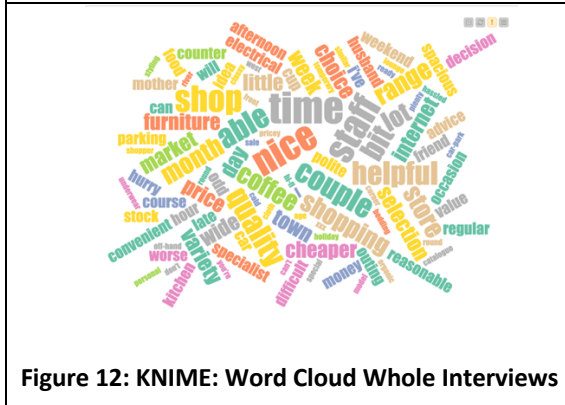
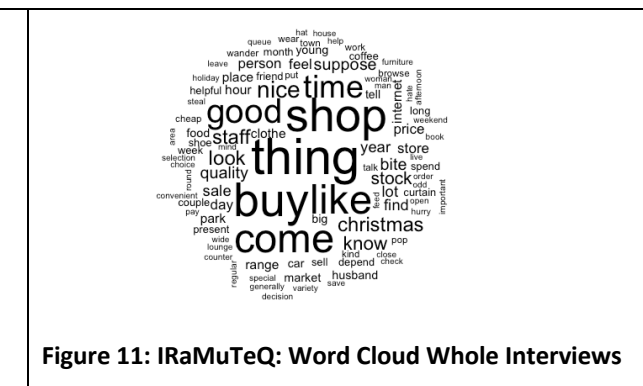
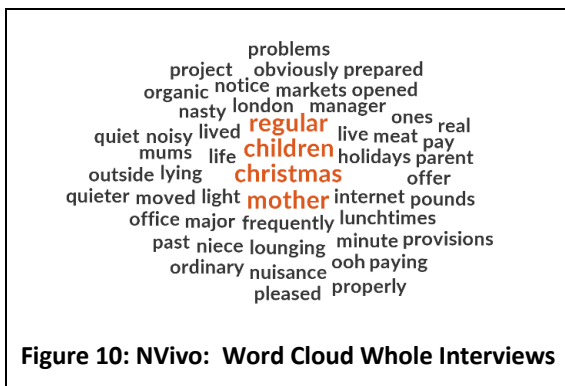
Topic	Topics Extracted
Topic 1	patient, time, system, model, cost, capacity, service, referral, wait, scheduling
Topic 2	service, strategy, system, paper, finding, study, process, performance, purpose, research
Topic 3	service, product, firm, provider, pricing, policy, price, customer, consumer, model
Topic 4	management, research, operation, service, operations, production, manufacturing, supply, risk, chain
Topic 5	service, paper, operation, research, purpose, study, management, process, finding, literature
Topic 6	quality, service, performance, customer, research, datum, effect, hospital, satisfaction, examine

Figure 8: KNIME: Themes Literature Review

THEME_01	CH1_1	THEME_02	CH1_2	THEME_03	CH1_3	THEME_04	CH1_4	THEME_05	CH1_5
DATA	219,799	PATIENT	344,861	PRODUCTIO	247,502	SUPPLY	446,591	ARTICLE	856,492
CASE	268,988	COST	268,988	OPERATION	200,388	CHAIN	497,188	SCOPUS	856,492
METHODS	196,155	QUALITY	197,363	SERVICES	192	EMERALD	223,774	WILEY-BLAC	281,818
INTERVIEW	162,000	HIGH	162,000	MANAGEMENT	162,000	PUBLISHING	222,262	ARJUNAL	228,267
ANALYSIS	128,454	SATISFACT	186,099	OFFERING	167,499	BUSINESS	149,999	INST	249,338
INTERVIEW	117,622	TIME	180,776	LIMITED	180,776	RES	133,138	RES	249,338
SURVIVAL	116,667	CUSTOMER	178,032	JOURNAL	151,222	MANAGEMENT	127,988	GAP	162,286
USE TO	110,918	WIRE	180,938	DELIVERY	145,438	CON	117,714	INFORM	107,435
HEALTH	68,097	REFERRAL	120,227	CAPABILITY	137,222	ECONOMY	92,988	SCIENCE	102,297
HEALTH	62,481	SIZE	116,281	KNOWLEDGE	130,498	CREDIBILITY	90,262	REVIEW	99,723
PHYSIC	55,345	LELAND	109,496	SERVICE	87,903	STRATEGY	85,974	MAN	79,395
PHYSIC	54,799	LEVEL	106,949	PERFORMANCE	85,948	OPERATIONAL	85,374	VAN	69,417
TEST	52,044	INVENTORY	102,197	COMMUNIT	75,608	INDUSTRY	84,287	ROTH	50,576
STRUCTURAL	49,841	HOSPITAL	101,922	INNOVATION	74,942	IND	83,463	AUDIT	48,125
LIMITATION	48,493	SEAT	100,345	PROPOSITIO	73,468	GLOBAL	79,334	HILL	43,421
PAPER	47,531	RESERVE	99,943	PRODUCTION	71,746	RISK	69,944	TD	33,954
EVALUATION	46,083	POLICY	99,827	PRODUCTION	70,228	SPONS	67,309	FINANCIAL	22,282
STATEMENTS	44,702	INFLUENCE	93,678	PRODUCTION	66,228	FINANC	57,392	CONFINAN	28,473
ADVIS	44,488	EMERGENCY	81,388	EMERGENCY	67,804	FINANCE	48,027	ELEMENT	28,404
DESIGN	43,936	REFINER	84,478	RESOLUTION	54,312	EMERGE	45,009	CONSUMER	18,233
CITY	42,908	CLINIC	81,388	EMERGENCY	49,451	MATCHING	48,451	MATCHING	18,983
COLLECT	41,936	CAPITAL	78,356	VALU	44,31	FINANCIAL	43,289	RICHMOND	18,103
PHYSICIAN	40,968	CLINIC	77,238	PUBLICATION	42,289	CONFINAN	42,029	AVC	14,757
QUALITATIV	40,723	EFFECTS	76,772	PUBLICATION	40,315	KINDREH	40,297	CLIENT	13,051
SECONDARY	40,608	PENALTY	72,897	INDUSTRI	37,088	IND	40,297	FAMILY	12,985
PHYSIC	38,518	REHABILIT	66,748	DISIN	36,717	MANUFACTU	38,404	TRITIN	11,727
CONCEPT	37,649	REPAIR	64,16	REPAIR	35,16	REPAIR	35,16	LEOP	11,279
QUANTITAT	37,057	CAPACITY	60,865	STRATEGIC	33,448	RECLAMAT	36,052	TRAFIC	11,279
PRACTICE	36,822	SPECIALIST	62,841	CLASSICAL	32,028	CONCEPT	34,944	ALDIH OH	11,056
SCIENCE	36,798	DEVELOP	61,908	MARKET	30,948	MARKET	30,948	PUBLICATI	10,341
SPECIFIC	34,698	INDUSTRI	60,43	PERFORMAN	27,208	INDUSTRI	32,448	INDUSTRI	9,482
USE	34,448	PERFORMAN	58,292	PERFORMAN	27,208	STRATEGIC	32,448	STRATEGIC	9,176
SAMPLE	32,584	MODE	57,862	CO-AUTHOR	26,648	DISCIPLINE	31,392	CONCLUDE	8,946
MANAGEMENT	32,258	HEALTHCARE	54,798	STRATEGIC	25,848	TRADE	30,328	MANAGEMENT	8,046
HUMANITARI	31,798	NEGATIVE	54,798	MODE	25,714	PUBLIC SECT	28,228	SAVING	8,046
SUPPORT	30,598	POLICIES	52,388	INFORMATION	25,714	PUBLIC SECT	28,228	SAVING	8,046
EMPLOY	30,298	PROFITABILITY	50,898	MODE	25,121	WORLD	27,457	SOCIETY	7,823
LIBR	30,228	PURCHASE	50,898	MARKET	24,809	PARLA	27,258	PARLI	7,823
IMPACT	29,998	PROFITABILITY	49,032	CREATE	23,733	SCHOOL	26,373	SALLETT	6,24
TRANSPORT	29,998	LEVEL	47,858	IMPACT	23,428	IMPACT	26,078	RELEVANT	6,24
DEMO STRUC	28,481	CONCEPT	46,471	DIFFER	23,228	CONCEPT	26,078	CONTRIBUTI	7,463
ANALYSIS	27,997	MARKET	46,448	BEHAVIORAL	22,807	CONCEPT	25,548	CARRY CHU	7,14
FEEDBACK	27,997	MARKET	45,73	FEEDBACK	22,807	CONCEPT	24,574	CARRONCHI	6,847
PURPOSE	26,729	CONCEPT	45,04	VIEW	21,978	COMPETITIV	23,888	NEED	6,847
EVALUATION	26,729	CONCEPT	45,04	VIEW	21,978	COMPETITIV	23,888	COMPANY	6,847

Figure 9: T-Lab: Themes Literature Review

5.3 Text Analytics of Whole Interview Data: Word Clouds



5.4 Text Analytics of Whole Interview Data: Themes

Cannot be done automatically without user input.

Figure 14: NVivo: Themes Whole Interviews

	Topics Extracted
Topic 1	hat, west, summer, kitchen, polish, experienced, lady, courteous, polite, extremely
Topic 2	time, shop, stock, look, buy, clothes, feel, try, sometimes, sale
Topic 3	friend, we've, library, live, handbag, counter, store, odd, furnishings, occasion
Topic 4	buy, there's, shop, i've, quality, christmas, don't, nice, lot, staff
Topic 5	kds, hate, tuesday, specific, pop, park, feed, bit, nail-bar, somehow
Topic 6	curtain, talk, lounge, unless, car, able, store, plenty, finish, prescription

Figure 16: KNIME: Themes Whole Interviews



Figure 15: IRaMuTeQ: Themes Whole Interviews

THEME_01	CH12_1	THEME_02	CH12_2	THEME_03	CH12_3	THEME_04	CH12_4
STOCK	62.097	SPEND	59.732	QUALITY	16.545	KDS	29.546
PRODUCT	36.255	LONG	32.782	GOOD	8.434	REASON	28.836
INTRODUCE	21.846	STORE	25.803	YEAR	8.114	INTERVIEW	25.702
CONSIDER	21.846	LOOK	20.229	PARK	7.2	CHOOSE	25.702
CHRISTMAS	17.529	MARKET	15.552	TILL	6.29	MIDDLE_AGED	21.383
NICE	15.965	INTERNET	11.526	QUEUE	6.29	JAN	21.383
RANGE	11.899		0	POLITE	6.29	RIVAL	21.383
KDS	8.969		0	VARIETY	6.29	LADY	16.205
	0		0	BROWSE	6.29	SHOP	13.777
	0		0	ASPECT	6.29	BUY	9.01

Figure 17: T-Lab: Themes Whole Interviews

6. Analysis and Discussion

6.1 Literature Review Results Analysis

The results show that all four tools can generate word clouds and reflect the most common words in the literature review data set (see Figure 2 through Figure 5), although the interpretability of word cloud results for IRaMuTeQ, KNIME and T-Lab is limited as the softwares do not colour code or remove most common terms automatically. NVivo, on the other hand, utilises colours and common words removal effectively to reflect the diversity of the literature on the topic (see Figure 2).

Three out of the four tools (IRaMuTeQ, KNIME and T-Lab) were able to auto identify topics within the literature review data set, without any human input. However, NVivo lacks this capability. Consulting the manual suggested that users need to manually code at least 10% of the inputs with themes before the automated coding could be enabled. This would require significant input from researchers, directly proportional to the sample size. The remaining three tools, T-Lab, IRaMuTeQ, and KNIME were able to highlighting themes consistent with the manually generated ones, such as service operation, service quality, strategy, and value (see Table 4).

Table 4: Literature Review Themes Results Analysis

Human Derived Themes	NVivo	IRaMuTeQ (4 topics)				Total theme coverage	T-Lab (5 topics)					Total theme coverage	KNIME ML (6 topics)						Total theme coverage
		Topic 1	Topic 2	Topic 3	Topic 4		Topic 1	Topic 2	Topic 3	Topic 4	Topic 5		Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	
for Literature Review																			
Theme 1: Operations Strategy	n/a	x	x			100%			x			100%		x		x		x	100%
Theme 2: Service Design & Delivery	n/a	x				30%		x	x			70%	x					x	70%
Theme 3: Operations Management	n/a			x	x	100%		x				100%	x		x			x	90%
Theme 4: Innovation	n/a					0%			x			75%							0%
Mean Coverage	n/a					58%						86%							65%
Coverage SD	n/a					0.51						0.17							0.46
Coverage (per topic used)	n/a					15%						44%							13%

T-Lab offered excellent coverage at 86% overall across just 2 topics. This was followed by KNIME at 65% and IRaMuTeQ, at 58%. The average efficiency of each topic for theme coverage is again highest in T-Lab and it is worth noting that both T-Lab and KNIME derived at least one topic which was not related to the human derived themes. The main issue, however, is that each software defaulted to different number of topics and thus although the three software tools can be used for thematic analysis, the results may be inconsistent, depending on the choice of software.

The results are encouraging as they suggest that ML tools may offer effective support to social science researchers conducting literature reviews in identifying themes from the research. However, the results are highly dependent on the tool used and suggest that specialist tools (such as T-Lab) may offer an advantage in automated elicitation of meaningful themes over more generalist tools such as IRaMuTeQ and KNIME. However, interpreting the results poses challenges as the correspondence between themes and topics is not one-to-one across all software tested. This means that as a rule several topics contribute to each theme (for example, in IRaMuTeQ results, both topic 1 and topic 2 contribute to Theme 1), and/or each topic contributes to more than one theme (topic 1 in IRaMuTeQ contributes to both Theme 1 and Theme 2). This indicated that each software uses different criteria to the researcher to derive similar themes. This is perhaps unsurprising, but highlights the need to further research to enable researchers to find machine learning algorithms to group and identify topics based on the researcher’s predefined criteria.

6.2 Interview Results Analysis

Working with the much smaller data set of semi-structured interviews, three out of the four software tools (IRaMuTeQ, KNIME and T-Lab) were able to produce word clouds that indicated aspects of the user experience such as range, product, quality, and staff (see Figure 10 through to Figure 13). However, the word cloud produced by NVivo offered little insight, suggesting that the software is less able to cope well with smaller data samples. The results from the topic extraction (see Table 5) show that the performance of the three tools able to complete the analysis, either stayed the same or deteriorated as the data sample size decreased. In fact, despite a marginal improvement in theme coverage (to 59%) IRaMuTeQ offered very little generalisation across the interviews by extracting 7 topics out of the 9 interviews which suggest that each individual interview is treated as a separate topic. This significantly limits the utility of the tool to meaningfully extract themes across interviews. As a rule, the granularity of topic coverage across each theme increased as the data size decreased, and each theme was described by higher number of topics and each topic also contributed to more themes. The results suggest that ML is not yet able to handle small data samples and elicit meaningful topics/themes automatically.

Table 5: Whole Interview Data Themes Results Analysis

Human Derived Themes for Interviews	NVivo	IRaMuTeQ (7 topics)							Total theme coverage	T-Lab (4 topics)				Total theme coverage	KNIME ML (6 topics)						Total theme coverage
		Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	Topic 7		Topic 1	Topic 2	Topic 3	Topic 4		Topic 1	Topic 2	Topic 3	Topic 4	Topic 5	Topic 6	
Theme 1: Motivation for visiting	n/a	x	x			x		x	75%	x		x		100%	x	x	x		x	x	50%
Theme 2: Motivation for purchasing	n/a	x	x	x				x	50%	x		x		75%		x	x	x	x	x	50%
Theme 3: Value for Money	n/a			x		x	x	x	50%	x		x		50%	x	x	x	x	x		50%
Theme 4: Sophistication	n/a	x				x		x	25%					0%		x				x	25%
Theme 5: Competitors	n/a		x		x				80%		x		x	70%			x				25%
Theme 6: Visit frequency	n/a	x					x		75%	x		x		75%	x	x	x	x	x		25%
Mean Coverage	n/a								59%					62%							38%
Coverage SD	n/a								0.22					0.35							0.14
Coverage (per topic used)	n/a								9%					16%							7%

It is worth noting that the interviews were analysed a whole rather than per question which may have adversely affected the results. Empirical evidence has shown that breaking up semi-interviews and analysing per question rather than as whole may lead to better thematic analysis results (Truong, 2022). However, this reduces the data sample size even further and IRaMuTeQ and T-Lab were not able to complete the analysis and returned a matrix identification error.

KNIME proved to be the most robust software under small sample size conditions when data were presented per question (Q2 – “Why shop at KDS”) and was able to derive four topics. The themes identified align meaningfully with theme 1, and 2 from the coding book (motivation for visiting and motivation for purchasing) (see Table 6). However, although the topics aligned fully with the human derived themes, the topics were fragmented across the themes making it difficult to interpret the results in the context defined by the researcher. This result confirms previous findings by Truong (2022), that analysis of semi structured interviews carried out on a question per question basis may offer advantages when utilising ML for automatic theme detection. This

may be in part because questions are framed in a particular context and ML algorithms are optimised to work well within specific context rather than across different contexts. The granularity of the results mapping of themes to topics and the resulting challenges in interpretation reiterate the finding that further research is required as to the best approach to facilitate the ability of researchers to pass topic definitions to machine learning algorithms, in order to improve their automated topic identification accuracy.

Table 6: Interview Data Themes Results Analysis of Q2 Why do you shop at KDS?

Human Derived Themes	NVivo	IRaMuTeQ	T-Lab	KNIME ML (4 topics)					Total theme coverage	Topics Extracted
				Topic 1	Topic 2	Topic 3	Topic 4			
Q2									Topic 1	shop, able, time, feel, staff, bit, stock, park, nice, sale
Theme 1: Motivation for visiting	n/a	n/a	n/a	x	x	x		100%	Topic 2	people, nice, tell, steal, warm, live, there's, off-hand, car, park, sell
Theme 2: Motivation for purchasing	n/a	n/a	n/a	x	x	x	x	100%	Topic 3	there's, food, lot, shopping, staff, suppose, coffee, they're, regular, sometimes
Coverage (per topic used)	n/a	n/a	n/a					25%	Topic 4	day, hat, you're, nice, suppose, rest, quiet, café, market, noisy

The results show that ML tools, can be effective in identifying topics that align reasonably closely with human derived themes. Thus, adoption of ML may allow researchers explore and understand qualitative data faster and with less ambiguity. This is particularly pertinent in the early stages of Thematic Analysis which require researchers to pre-examine the data, highlight potential points of interest, and assign labels. Adopting ML and NLP can help resolve coding inconsistencies and improve the transparency, reliability, and reproducibility of the analysis, particularly when working as part of team. Creating codebooks and thematic coding are complex and laborious processes, requiring extensive training and multiple coding revisions, even when following good practice guidelines and coding rules. ML and NLP tools can help automate these processes, minimising the need for manual input, and code creation and revisions.

However, overreliance on the ML tools and lack of understanding of their limitations may result in incomplete or misleading results. Moreover, de-contextualized features such keywords and word counts cannot replace the nuances captured as a result of immersion in the text and identification of latent or implicit representation of the concept under study. This is particularly true in the case of underrepresented constructs or emerging themes, which would be ignored by ML software as outliers. Therefore, there is need to offer social science researchers appropriate training in the capabilities and limitations of ML software and equip them with valuable skills that allow them to leverage ML tools to enhance their research practices.

7. Conclusions and Recommendations

In conclusion, ML NLP tools such as KNIME could provide effective support in identifying topics from small datasets, which align with human derived themes and thus can be utilized as support tools in thematic analysis. The results show that specialised software such as T-Lab can offer advantages in eliciting themes from academic abstracts with at least 200 observations, while generalist ML NLP software such as KNIME are robust even with much smaller data samples. The paper contributed to furthering our understanding of the effectiveness of ML and NLP tools in social science research with small data sets and highlighted the need for effective research skills training and development for qualitative researchers. Future research could focus on further examination of the limitations of software tools and the potential disruptive effect in the area of text analytics of Generative Pre-trained Transformer tools such as OpenAI's ChatGPT.

References

- Anderson, R., Taylor, S., Taylor, T. and Virues-Ortega, J. (2021) "Thematic and textual analysis methods for developing social validity questionnaires in Applied Behaviour Analysis", *Behavioural Interventions*, 37(3), pp. 732–753. doi:10.1002/bin.1832.
- Blei, D. M., Ng, A. Y. and Jordan, M. I. (2003) "Latent Dirichlet Allocation", *Journal of Machine Learning Research*, 3, pp.993-1022.
- Braun, V. and Clarke, V. (2006) "Using thematic analysis in psychology", *Qualitative Research in Psychology*, 3(2), pp.77-101
- Clarke, V., Braun, V., Terry, G. and Hayfield N. (2019) *Thematic analysis*. In Liamputtong, P. (Edn.) Handbook of research methods in health and social sciences (pp.843-860). Springer. https://doi.org/10.1007/978-981-10-5251-4_103.
- Davidson, J. E., Ye, G., Parra, M. C., Choflet, A., Lee, K., Barnes, A., Harkavy-Friedman, J. and Zisook, S. (2021) "Job-Related Problems Prior to Nurse Suicide, 2003-2017: A Mixed Methods Analysis Using Natural Language Processing and

- Thematic Analysis”, *Journal of Nursing Regulation*, 12(1), pp.28-39. [https://doi.org/10.1016/s2155-8256\(21\)00017-x](https://doi.org/10.1016/s2155-8256(21)00017-x)
- Fielding, N. G. (2002) *Interviewing*. London. Thousand Oaks. CA: Sage.
- Firmin, R.L., Bonfils, K.A., Luther, L., Minor, K.S. and Salyers, M.P. (2017) “Using text-analysis computer software and thematic analysis on the same qualitative data: A case example.”, *Qualitative Psychology*, 4(3), pp.201-210. <https://doi.org/10.1037/qap0000050>.
- Fonteyn, M. E., Vettese, M., Lancaster, D. R. and Bauer-Wu, S. (2008) “Developing a codebook to guide content analysis of expressive writing transcripts”, *Applied Nursing Research*, 21(3), pp.165–168. <https://doi.org/10.1016/j.apnr.2006.08.005>
- Guest, G., MacQueen, K.M. and Namey, E.E. (2012) *Applied Thematic Analysis*. 1stedn. Los Angeles: Sage.
- Gupta, A. and Katarya, R. (2020) “Social media based surveillance systems for healthcare using machine learning: A systematic review”, *Journal of Biomedical Informatics*, 108, pp.103500. <https://doi.org/10.1016/j.jbi.2020.103500>.
- Hwang, S. (2008) “Utilizing qualitative data analysis software a review of atlas. ti.”, *Social Science Computer Review*, 26, pp.519-527.
- Kim, K., Ye, G. Y., Haddad, A. M., Kos, N., Zisook, S. and Davidson, J. E. (2022) “Thematic analysis and natural language processing of job-related problems prior to physician suicide in 2003–2018”, *Suicide and Life-Threatening Behaviour*, 52(5), pp.1002–1011. <https://doi.org/10.1111/sltb.12896>.
- Meyer, D. Z. and Avery, L. M. (2009) “Excel as a Qualitative Data Analysis Tool”, *Field Methods*, 21(1), pp.91-112. <https://doi.org/10.1177/1525822X08323985>.
- Mikolov, T., Sutskever, I., Chen, K., Corrado, G. and Dean, J. (2013b) “Distributed Representations of Words and Phrases and their Compositionality”, *arXiv*. <https://doi.org/10.48550/arxiv.1310.4546>.
- Miles, M.B. and Huberman, A.M. (1994) *Qualitative data analysis: an expanded sourcebook*. Sage Publications.
- Riekert, M., Riekert, M. and Klein, A. (2021) “Simple Baseline Machine Learning Text Classifiers for Small Datasets”, *SN Computer Science*, 2(3), pp.178. <https://doi.org/10.1007/s42979-021-00480-4>.
- Sobania, D., Briesch, M., Hanna, C. and Petke, J. (2023) “An analysis of the automatic bug fixing performance of ChatGPT”, *arXiv*. <https://doi.org/10.48550/arXiv.2301.08653>.
- Spector, J.M. and Ma, S. (2019) “Inquiry and critical thinking skills for the next generation: From Artificial Intelligence back to human intelligence”, *Smart Learning Environments*, 6(1). <https://doi.org/10.1186/s40561-019-0088-z>.
- Tate, T. P., Doroudi, S., Ritchie, D. and Xu, Y. (2023) “Educational research and AI-generated writing: Confronting the coming tsunami”, *EdArXiv*. <https://doi.org/10.35542/osf.io/4mec3>.
- Troung, D. (2022) *NVivo R1 (MAC) - coding purpose, coding process, and how to perform interactive coding in NVivoDothang*, YouTube. Available at: <https://www.youtube.com/watch?v=HoLjzktKh40&list=PLRDHFVPPFwalDu6EKuq4MXCvMjPztD840D&index=10> (Accessed: 06 June 2023).

The Double Cognitive Bias of Mistakes: A Measurement Method

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Abstract: There is no learning without mistakes. However, making mistakes among knowledge workers is still seen as shameful. There is a clash between positive attitudes and beliefs regarding the power of gaining new (tacit) knowledge by acting in new contexts and negative attitudes and beliefs toward accompanying mistakes that are sources of learning. These contradictory attitudes create a bias that is doubled by the other shared solid belief that “BOSSSES NEVER MAKE MISTAKES.” The double cognitive bias of mistakes introduced by Kucharska and Bedford (2023) is assumed in this paper to harm organizational learning and collective intelligence development. To justify this point empirically in this paper, the authors propose a procedure enabling the measurement of the double cognitive bias of mistakes. Moreover, to validate the proposed method, authors empirically examine the influence of the KLC cultures’ synergy on knowledge sharing and organizational intelligence and compare obtained results with the effect observed for the sample free of the double bias of mistakes. Novelty: this study is the first to propose identifying the double bias of mistakes and empirically exposing its impacts.

Keywords: the cognitive bias, the cognitive bias of mistakes, the double bias of mistakes, KLC cultures, knowledge culture, learning culture, collaborative culture, company culture, organizational intelligence, collective intelligence, fixed mindset, growth mindset, change adaptability, tacit knowledge sharing, explicit knowledge sharing, trust

1. Introduction

The bias of mistakes essence is rooted in the specific cognitive bias (Tversky and Kahneman, 1981) named the framing effect (Clark, 2009; Druckman, 2001a-b; Plous, 1993). The bias of mistakes is a bias caused by the positive claims about mistakes as a natural part of humanity but at the same time of the negative experiences of their consequences, resulting in the negative framing effect of mistakes (experiences affect us stronger than statements). The framing effect is observed if negative or positive connotations of the particular phenomenon (here: mistakes) impact its perception and judgment. The framing result is one of the most significant biases influencing situational judging and decision-making (Thomas and Millar, 2011). So, the negative framing effect of mistakes can be then very powerful – it can affect situational judgment and decisions. Therefore, it is worth studying more-in depth.

The framing, negative effect of mistakes perception - the bias of mistakes introduced by Kucharska and Bedford (2023a), can make individuals’ learning from mistakes problematic (Hull, 1930). Precisely, according to the Transformative Learning Theory (Mezirow, 1995), which claims that adult learning happens thanks to modified interpretations of the meanings of personal experiences and frames of reference through critical reflection, where critical reflection is seen as a result of "intuitively becoming aware that something is wrong with the result of one's thought, or challenging its validity through discourse with others of differing viewpoints and arriving at the best-informed judgment" (Mezirow, 1995, p. 46) – mistakes reflectivity is, from this point, a critical factor for learning. If mistakes are denied or ignored – then they cannot be a source of reflection and learning for anybody, no for mistakes maker, nor for anyone else. Hidden mistakes bring harm and are a waste of value rather than a precious lesson-learned source (Kucharska and Rebelo, 2022a). It is in line with the concept of negative resource spirals (Hobfoll et al., 2018), according to which the loss of one resource (e.g., knowledge from mistakes) can generate losses of other resources. A lack of learning from experience is a waste. Mistakes are precious, common human experiences. Without accepting them, we can neither understand their meaning nor learn from them

The double bias of mistakes introduced by Kucharska and Bedford (2023a) concerns collective organizational learning mainly and, according to those authors, significantly impacts organizational intelligence (Kucharska and Bedford, 2023b). Briefly, the double bias of mistakes is an upshot of the negative framing effect of mistakes that is additionally doubled by the shared belief that “BOSSSES NEVER MAKE MISTAKES” grounded in fixed mindsets (Dweck, 2017).

Fixed and growth mindsets and organizational learning troubles

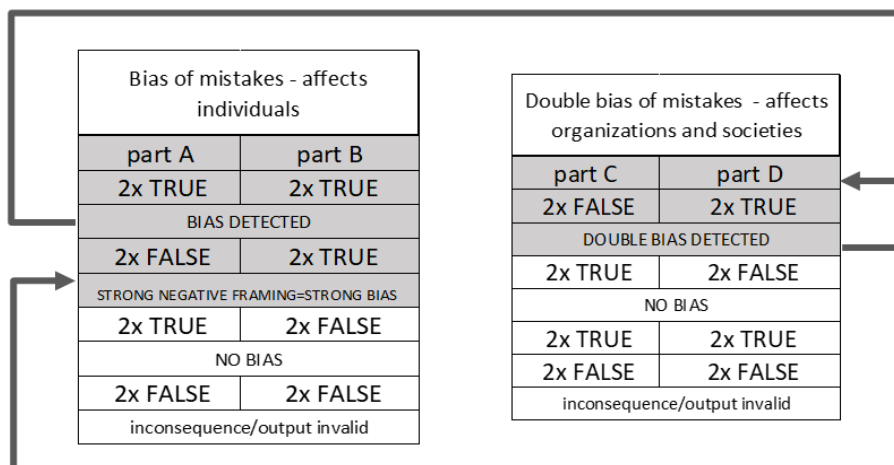
There is a chain of consequences of the existing double bias. First, the fear of personal consequences of mistakes may lead to a cultivation of a fixed instead of growing mindset domination in society (Dweck, 2017; Athota, 2021). Mindset (mental model) is a “psychological construction” comprised of an internally held structure (Vazquez et al., 1996) that shapes a particular person’s perception of things and determines the entire understanding of the world (Shih and Alessi, 1993; Doyle and Ford, 1998). Such personal perception and understanding shape attitudes and behaviors towards everything, including those important for this study’s mistakes that influence learning abilities. So, growth mindsets are learning-oriented (constant progress), while fixed mindsets are image-oriented (constant confirmation of self-perfection). As a consequence, a fixed mindset makes people non-learners in the long run perspective (Dweck, 2017). Learning-oriented mindsets love a challenge, believe in learning effort, are resilient in the face of setbacks, and are creative (Dweck, 2017, p. 19). Fixed mindsets perceive failure as a lack of intelligence, so any validation of own actions is risky. They often believe avoiding any challenge that can expose setbacks and cause a social rejection of the revealed lack of perfection is better than taking the risk of failure because “bosses never make mistakes,” – people believe. So, bosses avoid the risk of making mistakes for two reasons: first reason – to keep their positive self-image; second, to prove to others they are fully justified to keep their positions because there exists the shared belief that “bosses never make mistakes” – they are “perfect.”

It is why we have a crisis of transformational leadership. Leaders with fixed mindsets avoid any risk of losing their image, so “fixed mindset” dominates in led by the organizations. Organizations with dominated fixed mindsets and not accepting mistakes as a potential source of learning can face serious troubles in developing shared collective intelligence, as stated by Kucharska and Bedford (2023a-b). So, bosses’ fixed/growth mindsets shape the organizational shared mindset (company culture) that next affects the organizational ability to learn and adapt to changes. Transformational leaders are identified as those who create a company culture that fosters learning from mistakes and supports adaptability to change (Kucharska and Rebelo, 2022b; Kucharska et al., 2022; Samhran et al., 2022). Feuerstein et al. (1979) defined intelligence as the ability to adapt to change. Following him, the organizational capacity to adapt to change is seen in this study as organizational intelligence.

To empirically prove that a double bias of mistakes makes organizational learning problematic, there is a need to introduce a method enabling measurement of the double bias of mistakes first, next to prove its negative influence on collective intelligence creation. The next section presents this method’s details.

1.1 Method of the double bias of mistakes measurement

Since the essence of the doubled bias of mistakes is a negative attitude: first, towards mistakes generally, second, towards bosses’ mistakes, then the point of its measurement method is denoting an instrument enabling measuring these two attitudes simultaneously (in the same questionnaire). Table 1 presents the proposed procedure. Whereas Figure 1 visualizes it.



- A: *mistakes are a natural part of learning or experimenting; **To err is human
- B: *mistakes are negatively seen; **It is better to hide than claim a mistake
- C: *mistakes are reported and openly discussed; ** mistakes are seen in my organization as a natural consequence of the process of learning, searching for new solutions, and experimenting
- D: *my boss expects to be seen as always right (fixed mindsets); **my boss does not accept mistakes (fixed mindset)

Figure 1: The detection of double bias of mistakes - scheme of analysis and mutual interdependence

Table 1: The double bias of mistakes measurement method

	Definition	Statements	Procedure
Bias of mistakes (Kucharska and Bedford, 2023)	It is a bias caused by the former strong framing effect or caused by the contradiction. Precisely positive claims about mistakes as a natural part of learning and humanity but at the same time of the negative experiences of their consequences, resulting in the negative framing effect of mistakes (experiences affect us stronger than any statements).	<p>A. <u>-OPINION</u></p> <p>In your opinion, the following statements are true or false?</p> <ul style="list-style-type: none"> Mistakes are a natural part of learning or experimenting To err is human <p>B. <u>EXPERIENCE</u></p> <p>Regarding your experiences:</p> <ul style="list-style-type: none"> Mistakes are negatively seen It is better to hide a mistake 	These statements can be credited to any questionnaire when we aim to analyze the mistake's biased impact on the explored phenomenon. Still, both parts A and part B should be included in the questionnaire separately (not one by one). The essence of the bias of mistakes detection is the observed contradiction or strong negative framing between OPINIONS (part A) and EXPERIENCES (part B). For example, suppose respondents answer positively to A (2xtrue) and part B (2xtrue). In that case, we observe the contradiction that causes the cognitive bias, which is next transformed into a framing effect as a stronger upshot of experiences above opinions. The strong framing effect based on the prior intense negative experiences is also possible to detect A (2xfalse) and B (2xtrue) cases.
Double bias of mistakes (Kucharska and Bedford, 2023)	It is an upshot of the negative framing effect of mistakes that is additionally doubled by the shared belief that "BOSSSES NEVER MAKE MISTAKES" grounded in fixed mindsets dominated in the particular group, organization, or society.	<p>Are the following statements true or false regarding your current workplace/group/society?</p> <p>C. <u>ORGANIZATION/GROUP etc.</u></p> <ul style="list-style-type: none"> Mistakes are reported and openly discussed Mistakes are seen in my organization as a natural consequence of the process of learning, searching for new solutions, and experimenting <p>D. <u>LEADER</u></p> <ul style="list-style-type: none"> My boss expects to be seen as always right My boss does not accept mistakes 	These statements can be credited to any questionnaire when we aim to analyze the doubled mistake's biased impact on the explored phenomenon. Still, parts A and B should be included in the questionnaire separately (not one by one) to indicate the potential doubled bias of mistakes more naturally. This is important because the essence of the double bias of mistake detection in the organization is the observed compatibility between ORGANIZATION (part C) and BOSS (part D) negative framing effect of mistakes. For example, suppose respondents answer negatively to A (2xfalse) and positively to part B (2xtrue). In that case, we observe the framing effect of the mistakes bias doubled by the boss's fixed attitude.
<p>ATTENTION: To detect the bias more naturally, researchers should care about the certainty and reliability of giving statements. Therefore, intentionally A-B-C-D parts should be separated in a questionnaire (not displayed in a sequence one by one) to avoid fast and consequent answers without proper consideration. Moreover, statements should be formulated -one part in a positive and the other in a negative way to avoid manipulation by the statement tone.</p>			

1.2 Method validation procedure

The statements above were incorporated into the questionnaire dedicated to knowledge workers to validate the method. The sampling method and sample characteristics details come from Kucharska and Bedford's (2023b) study and it is presented below.

Sampling procedure: This study was targeted at Polish knowledge workers; therefore, qualified respondents declared that their work's first input and output is knowledge. Moreover, to secure the respondents' familiarity with their organizations' issues, we qualified only those who worked a minimum of one year for their current employer. Data were collected in March 2023 by applying the CAWI method by Biostat® Poland.

Sample characteristics: The sample is composed of 640 Polish knowledge workers: 306 specialists and 334 managers; 329 women and 311 men representing mostly private (77%) companies from different sectors to

illustrate the general view on Poland (dominating sectors: production and knowledge services 19% each). Measures: Respondents referred to the majority of questions using a 7-point Likert scale. Appendix 1 presents measured constructs scales and their sources. Obtained reliabilities are given in Table 1. Additionally, Appendix 2 presents the Cross-Loadings Matrix. It is because two of the nine used scales (the organizational Trust and the organizational IQ) were invented and validated by authors. The Cross-Loadings Matrix exposes that the used scales do not overlap. Control variable (CV): Trust was input into the model as CV; to do so, the composite variable was created based on the scale measures.

Method of analysis: Structural Equation Modeling (SEM) with the use of SPSS Amos 26 software (Byrne, 2016).

Sample quality: Kaiser–Meyer–Olkin (KMO) test: .957, the total variance extracted: 75%, and Harman one factor test: 44% justify the good quality of the TOTAL sample.

Furthermore, the self-reporting questionnaire has been created to examine the KLC culture’s influence on tacit knowledge sharing and change adaptability - organizational intelligence (Kucharska and Bedford, 2023b). According to the given above procedure, to detect the bias more naturally and intentionally, A-B-C-D parts were displayed separately in a questionnaire to avoid fast and consequent answers without careful consideration. Next, all cases (questionnaires) gathered before analysis were divided into two groups: Group A – with the double bias detected and Group B – without the bias (no bias). The detection procedure (Figure 1, Table 1) was performed according to the patterns: [A(2xtrue)B(2xtrue)C(2xfalse)D(2xtrue)] and [A(2xfalse)B(2xtrue)C(2xfalse)D(2xtrue)]; ‘no bias’ was detected by pattern: [A(2xtrue)B(2xfalse)C(2xtrue)D(2xfalse)]. Finally, questionnaires (cases) with inconsequent answers were excluded as invalid. The total sample size was n=640 cases. Group A (the double bias) size was 184 cases; Group B (no bias) n=327 cases. It means that 139 respondents exposed inconsequences in their answers regarding mistakes. It can be interpreted as respondents’ negligence or an effect of the mistakes bias, especially since the entire sample quality was positively verified (Kucharska and Bedford, 2023b). However, focusing strictly on the proposed method validation, these 139 cases were excluded from further analysis. Consequently, since the total sample, after the exclusion, became smaller n=511, and additionally divided into two groups, A n=184 and B n=327, the model by Kucharska and Bedford (2023b) was simplified to enable the data analysis using the same structural equation modeling SEM method. The conceptual framework of the original model is given in Kucharska and Bedford’s (2023b) study, and details of constructs included in its simplified version are presented below in Table 2 below.

1.2.1 Table 2: Scales and their sources

1.2.1 Knowledge culture 1.2.1 (Kucharska and Bedford, 2020)	<ul style="list-style-type: none"> All employees perceive knowledge as a valuable resource. We have a common language to support knowledge exchange. We are encouraged to share knowledge, ideas, and thoughts. We care about the quality of knowledge that we share.
1.2.1 Learning culture 1.2.1 (Kucharska and Bedford, 2020)	<p><u>Learning climate component</u></p> <ul style="list-style-type: none"> All staff demonstrates a high learning disposition. We are encouraged to engage in personal development. We are encouraged to implement new ideas every day. We are encouraged to engage in seeking new solutions. <p><u>Mistakes acceptance component</u></p> <ul style="list-style-type: none"> People know that mistakes are a learning consequence and tolerate it up to a certain limit. Most people freely declare mistakes. We discuss problems openly without blaming others. Mistakes are tolerated and treated as learning opportunities.
1.2.1 Collaborative culture 1.2.1 (Kucharska and Bedford, 2020)	<ul style="list-style-type: none"> My company supports cooperation between workers Cooperation among the different duties, teams, and departments was encouraged Co-workers volunteer their support even without being asked People support each other
1.2.1 Change adaptability (org. intelligence - IQ) 1.2.1 (Kucharska and Bedford, 2020)	<ul style="list-style-type: none"> We are flexible to changes We can adjust ourselves to changes We adapt to changes easily We used changes
1.2.1 Tacit knowledge sharing 1.2.1 (Kucharska and Erickson, 2023)	<ul style="list-style-type: none"> I share knowledge learned from my own experience I have the opportunity to learn from the experiences of others Colleagues share new ideas with me Colleagues include me in discussions about the best practices

1.2.1 <i>Explicit knowledge sharing</i> 1.2.1 (Kucharska and Bedford, 2023b)	<ul style="list-style-type: none"> • There is a formal policy encouraging knowledge sharing at my place of work. • Knowledge is shared among people in my team and division. • Other teams and divisions share knowledge with us. • We share our knowledge with other teams and divisions.
1.2.1 <i>TRUST</i> 1.2.1 (Kucharska and Bedford, 2023b)	<ul style="list-style-type: none"> • I trust people at work. • People in my team trust one another. • People in my division trust one another. • People in my entire organization trust one another.
1.2.1 <i>External, market innovations</i> 1.2.1 (Kucharska and Erickson, 2023)	<ul style="list-style-type: none"> • We provide competitively superior innovations to our clients. • Our innovations are perceived positively by our clients. • We are better than our competitors at introducing innovations. I am proud of our innovations.
1.2.1 <i>Bias of mistakes -personal</i> 1.2.1 1.2.1 <i>Authors' method given in this study</i>	<ul style="list-style-type: none"> • Mistakes are a natural part of learning or experimenting/A • To err is human/A • Mistakes are negatively seen/B • It is better to hide than claim a mistake/B
1.2.1 <i>Double bias of mistakes - communal: group/organization/society</i> 1.2.1 1.2.1 <i>Authors' method given in this study</i>	<ul style="list-style-type: none"> • Mistakes are reported and openly discussed/C • Mistakes are seen in my organization as a natural consequence of the process of learning, searching for new solutions, and experimenting/C • My boss expects to be seen as always right/D • My boss does not accept mistakes/D

2. Validation results

The proposed method is validated through comparison among obtained results by based model by Kucharska and Bedford (2023b) measured based on the TOTAL sample (n=640 cases) and models based on sub-samples identified through the grouping questionnaires free of mistakes bias (n=327 cases), and cases with the identified doubled bias o mistakes (n=184 cases), accordingly to the proposed in this paper method. To compare results, the qualities of both sub-samples were first assessed, and next, models were performed and analyzed.

Samples quality Kaiser–Meyer–Olkin (KMO) test: for the sample free from the double bias and the sample with the identified double bias of mistakes results are: .952/.918 respectively; the total variance extracted: 65%/67% respectively and, Harman one factor test: 48%/42% respectively – all these results justify the good quality of both sub-samples.

The evaluation of the models' qualities was initially conducted based on constructs measurements consistency tests such as the average of variance extracted (AVE), composite reliability (CR), and Cronbach's alpha. AVE exceeded 0.52 for all constructs, which was acceptable (Hair et al., 2017). Cronbach's alpha test was used to confirm the consistency of the construct measurement model. The alpha coefficient was greater than 0.71 for all constructs, which was adequate (Hair et al. 2017, pp. 112). The CR was greater than 0.72 for all loadings, exceeding the required minimum of 0.7 (Hair et al., 2017). The square root of each construct's AVE exceeded the correlations between the majority pairs of distinct constructs but not for all, and this situation requires comments.

The based sample exposes a strong correlation between CC-LCc and CC-EKS (in red in Table 3a). It means a strong interdependency exists between collaborative culture, learning climate, and knowledge sharing in Poland. The sub-sample without the double bias of mistakes (Table 3b) also exposes a very strong correlation between tacit knowledge sharing, organizational intelligence, and external innovations. At the same time, the sub-sample exposing the double bias of mistakes (Table 3c) exhibits a robust correlation between explicit knowledge and organizational intelligence, and external innovations. Altogether endangers, that in Poland exists a strong interdependency between collaborative culture, learning climate, and knowledge sharing, that the double bias of mistakes makes explicit knowledge a focal source of intelligence and innovations, whereas in a sample free from the double mistakes bias – the tacit knowledge is exposed as strongly correlated to organizational intelligence and external innovations creation. That suggests that the double bias of mistakes blocks tacit knowledge and overrates explicit knowledge– it is because organizational intelligence and innovations strongly correlate to the explicit knowledge in this sample. Tacit knowledge is proven to be significantly better than explicit knowledge sources of innovations (Kucharska, 2021a-b).

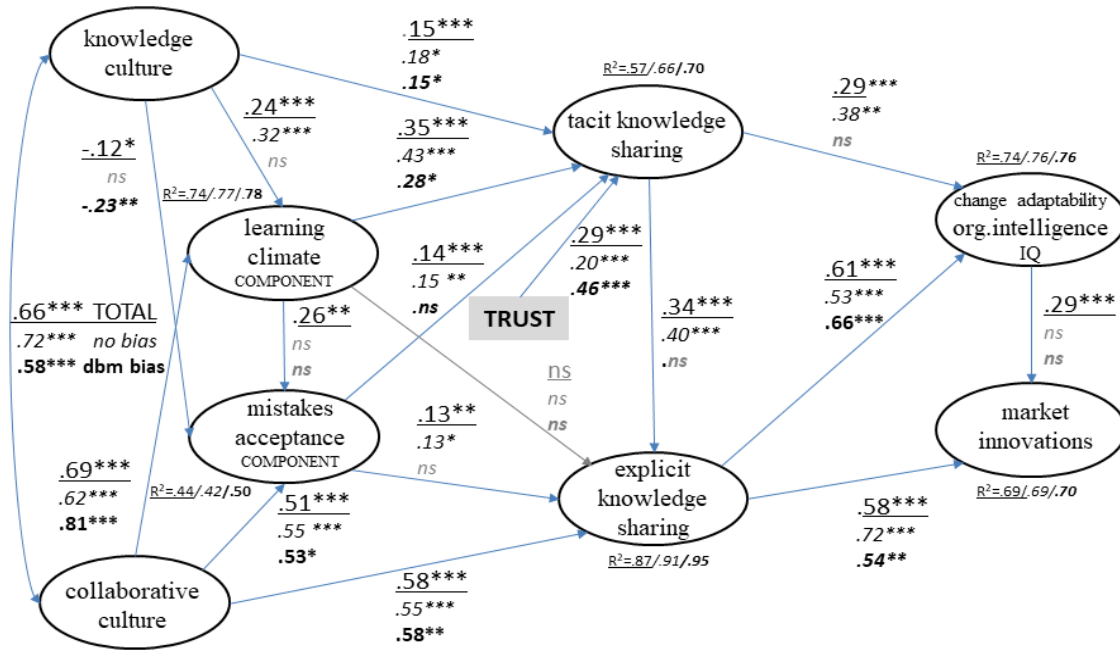


Figure 2: Method validation results

Note: n=640/n=327/n=183 (TOTAL/no bias/dbm bias) ML; $\chi^2=1043.45(331)/700.082(305)/638.55(305)$ CFI=.941/.939/.896 TLI=.933/.930/.880 RMSEA=.059/.063/.078; Cmin/df=3.15/2.27/2.09; p<.05 **p<.01 ***p<.001; ns-not significant result; dbm bias – the double bias of mistakes

Table 3: Basic statistics, obtained AVE root square, and correlations between constructs

a) TOTAL sample

	Mean	SD	AVE	CR	Cronbach alpha	T	CC	KC	LCc	LcM	TKS	EKS	IQ	InnE
T	3.59	2.01	.57	.79	.80	.753								
CC	3.68	2.09	.56	.86	.83	.677	.752							
KC	4.23	2.52	.71	.88	.88	.499	.657	.845						
LCc	3.74	2.15	.57	.79	.83	.586	.846	.693	.753					
LcM	3.12	1.7	.80	.94	.94	.437	.651	.398	.608	.894				
TKS	3.61	.07	.66	.85	.87	.637	.69	.606	.718	.543	.813			
EKS	3.56	1.98	.55	.79	.78	.668	.902	.642	.719	.692	.719	.742		
IQ	3.64	1.98	.59	.85	.85	.592	.75	.567	.708	.58	.786	.742	.765	
InnE	3.59	1.96	.54	.78	.77	.557	.738	.535	.678	.567	.697	.722	.758	.732

Note: n=640 KC-knowledge culture, LCc-learning culture climate component, LcM-Learning culture mistakes acceptance component, CC-collaborative culture, TKS-tacit knowledge sharing, EKS-explicit knowledge sharing, T-trust, IQ- organizational change adaptability, InnE – market (external) innovations. Source: Kucharska and Bedford (2023b).

b) No double bias of mistakes detected sample

	Mean	SD	AVE	CR	Cronbach alpha	T	CC	KC	LCc	LcM	TKS	EKS	IQ	InnE
T	3.49	1.98	.57	.79	.80	.753								
CC	3.50	2.00	.57	.86	.86	.674	.758							
KC	4.30	2.40	.74	.90	.89	.535	.721	.862						

	Mean	SD	AVE	CR	Cronbach alpha	T	CC	KC	LCc	LcM	TKS	EKS	IQ	InnE
LCc	3.70	2.50	.57	.79	.83	.587	.848	.765	.753					
LcM	2.8	1.1	.82	.95	.95	.438	.651	.455	.595	.908				
TKS	3.60	2.01	.65	.85	.85	.612	.725	.683	.743	.573	.809			
EKS	3.50	1.88	.55	.79	.80	.66	.907	.713	.732	.703	.722	.741		
IQ	3.50	1.89	.63	.87	.87	.578	.75	.632	.729	.586	.827	.739	.791	
InnE	3.49	1.96	.60	.82	.82	.549	.748	.594	.692	.581	.856	.728	.74	.772

Note: n=327

c) The double bias of mistakes detected sample

	Mean	SD	AVE	CR	Cronbach alpha	T	CC	KC	LCc	LcM	TKS	EKS	IQ	InnE
T	3.59	2.01	.57	.79	.80	.753								
CC	3.80	2.01	.58	.87	.85	.66	.764							
KC	4.19	2.40	.66	.85	.851	.485	.578	.811						
LCc	3.91	2.01	.57	.79	.812	.593	.881	.586	.753					
LcM	3.46	1.7	.77	.93	.93	.427	.673	.273	.652	.878				
TKS	3.70	1.90	.61	.82	.83	.753	.714	.594	.716	.511	.782			
EKS	3.71	1.90	.52	.76	.77	.729	.931	.607	.744	.673	.768	.719		
IQ	3.77	1.90	.56	.83	.83	.651	.791	.536	.742	.571	.782	.866	.746	
InnE	3.71	1.80	.46	.72	.71	.604	.759	.501	.707	.548	.725	.821	.731	.680

Note: n=184

The given model's results comparison by the prism of employed samples (Figure 2) endangers that the double bias of mistakes in organizations strengthens the negative influence of knowledge culture on the mistakes acceptance component of a learning culture. Moreover, its influence on the learning climate component is not significant. The knowledge culture correlation with collaborative culture is weaker than observed for the TOTAL and the 'no double bias' samples. So, the entire KLC cultures synergy approach proposed for knowledge-driven organizations by Kucharska and Bedford (2023a-b), when analyzed through the prism of the doubled cognitive bias of mistakes (DBM), reveals that DBM strengthens knowledge culture and weakens collaborative and learning cultures. It is visible in the entire KLC influence on knowledge sharing that is barely noticeable. Finally, DBM diminishes to zero tacit knowledge impact on organizational intelligence. This is clear in organizations with DBM-dominated organizational intelligence, and market innovations are driven by explicit knowledge only. Bearing in mind the existing body of knowledge (Kucharska 2021a-b), it is clear that such organizations, relying, in fact, mostly on old and verified knowledge and methods, have chances for incremental rather than radical innovations. This statement, however, requires empirical confirmation.

The model developed by Kucharska and Bedford (2023b) was employed here as a testing space for the method of the double bias identification introduced in this paper. Testing model initial results (analyzed without considering the DBM prism) exposed that the KLC cultures foster knowledge sharing and intelligence development in the knowledge-driven organizations that support innovativeness. The authors concluded that knowledge sharing, organizational intelligence, and innovativeness are vital benefits of the KLC culture's synergy. They noticed that trust (imputed as a control variable in the model) strengthens this effect. Based on the obtained results, trust influence is even more substantial in the model based on the DBM-dominated sample than in the original model and model "free from DBM". In practice, trust is a huge influencer, and lack of trust is a blocker of the DBM-dominated organizations. Organizations without DBM take full advantage of KLC synergy that enables the smooth creation of tacit knowledge fostering organizational intelligence development. So, DBM should be considered a severe blocker of organizational learning, intelligence, and innovativeness.

3. Practical implications

There are profound practical implications regarding the exposed effect of the double bias of mistakes dominated in organizations. The presented findings provoke a severe rethinking and probably also re-framing of the organizational approach to mistakes. Enterprises exposing a “zero tolerance to mistakes” in divisions and areas different than production or operations can face severe troubles with the constant ability to create a competitive advantage that comes from change adaptability (intelligence) and innovations developed in the long run perspective. Collective intelligence essence, seen as a network of knowledge workers' brilliant minds' that collaborate smoothly, is a severe organizational potency that needs to be activated. The double bias of mistakes can be a serious blocker of it because of its negative impact on collective learning.

4. Scientific implications

This study is the first that introduced the method enabling the identification of persons and organizations affected by the DBM to measure its influence on different aspects of human, organizational, or societal life. However, this study exposed how DBM blocks collective intelligence. Other studies are needed to expose other severe impacts that DBM can cause. Furthermore, the given research is based on a Polish knowledge workers sample. Polish historical backgrounds, such as, e.g., the nazists' occupation and the subsequent soviet occupation, cast shadows on how society perceives mistakes (mistakes may cost lives, and the shared national traumas affect generations). Also, the dominant Catholic religion in Poland narrates the mistake (sin) in a way that may sometimes support DBM when exposing stronger "fault" than "mercy." Summing up, there can be many national or local specifics that can strengthen or weaken DBM. At the same time, DBM consequences can also differ among organizations, societies, regions, and nations. Furthermore, such studies are worth being performed to fully understand how the DBM impacts countries, cultures, institutions, organizations, and communities and how to deal with the DBM impact to set free the collective intelligence.

Another important line of further research inspired by this study's findings cumulates around the question: How can organizations deal with the DBM to perform better? Moreover, how the AI development can influence the collective intelligence of the organization? Furthermore, how AI deals with mistakes bias? Is the AI the double bias of mistakes or any other bias-free? These interesting questions require further investigation.

5. Limitation

The conducted validation of the method exposed that it requires comparatively large samples. It is because “mistakes” are very sensitive issues. Therefore, to detect a DBM and next examine it in complex structures and compare effects with and without DBM detected – that helps fully understand the particular phenomenon and using, e.g., the SEM method, it is recommended to apply samples 400 and up per cohort.

Moreover, in this manuscript, the lack of consistency in the respondent's answers regarding mistakes perception and their experiences with mistakes at work was qualified as an invalid answer. As a result, the particular case (questionnaire) was excluded from further analysis. Bearing in mind the fact that the earlier verification of the sample quality (each questionnaire) was positive. It might be that the lack of consistency in mistakes perceptions and mistakes experiences at work even if other answers were consistent - should be seen as precisely a result of the mistakes bias.

6. Conclusion

The proposed method to measure the double bias of mistakes was positively validated. Furthermore, the method was validated and enabled to compare the effect of the DBM on the relation between KLC synergy and organizational intelligence and innovativeness. Findings revealed the severe impact that DBM puts on organizational intelligence by weakening collaborative and learning cultures and blocking tacit knowledge creation. These findings encourage further, deeper DBM exploration. Such questions: How can organizations deal with the DBM to perform better? Moreover, how can AI development influence the organization's collective intelligence? Furthermore, how AI deals with mistakes bias? Is the AI the double bias of mistakes or any other bias-free? – remain open.

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References

- Athota, V.S. (2021), *Mind over Matter and Artificial Intelligence. Building Employee Mental Fitness for Organisational Success*. Palgrave Macmillan.
- Clark, D. (2009), *Framing effects exposed*. Pearson Education.
- Doyle, J.K., and Ford, D.N. (1998), "Mental models concepts for system dynamics research," *System Dynamics Review*, Vol. 14 No. 1, pp. 3–29.
- Druckman, J.N. (2001a), "Evaluating framing effects," *Journal of Economic Psychology*, Vol. 22, pp. 96–101. [https://doi.org/10.1016/S0167-4870\(00\)00032-5](https://doi.org/10.1016/S0167-4870(00)00032-5).
- Druckman, J.N. (2001b), "Using credible advice to overcome framing effects," *Journal of Law, Economics, and Organization*, Vol. 17, pp. 62–82. <https://doi.org/10.1093/jleo/17.1.62.S2CID1640037>.
- Dweck, C.S. (2017), *Mindset*. New York: Brown, Little Book Group.
- Feuerstein, R., Feuerstein, S., Falik, L., and Rand, Y. (1979), *Dynamic Assessments of Cognitive Modifiability*, ICELP Press, Jerusalem, Israel.
- Hair, J.F., G.T. Hult, C.M. Ringle, and Sarstedt, M. (2017), *A primer on partial least squares structural equation modeling*. Beverly Hills: Sage.
- Hobfoll, S.E., Halbesleben, J., Neveu, J.-P., and Westman, M. (2018), "Conservation of resources in the organizational context: The reality of resources and their consequences," *Annual Review of Organizational Psychology and Organizational Behavior*, Vol. 5, pp. 103–128.
- Hull, C.L. (1930), "Simple trial and error learning: A study in psychological theory," *Psychological Review*, Vol. 37 No. 3, pp. 241–256. <https://doi.org/10.1037/h0073614>
- Kucharska, W. (2021a), "Leadership, culture, intellectual capital and knowledge processes for organizational innovativeness across industries: the case of Poland," *Journal of Intellectual Capital*, Vol. 22 No. 7, pp. 121-141. <https://doi.org/10.1108/JIC-02-2021-0047>
- Kucharska, W. (2021b), "Tacit knowledge influence on intellectual capital and innovativeness in the healthcare sector: A cross-country study of Poland and the US", *Journal of Business Research*, Vol. 149, pp. 869-883. <https://doi.org/10.1016/j.jbusres.2022.05.059>
- Kucharska, W., and Bedford, D.A.D. (2020), "Love your mistakes! – They help you adapt to change. How do knowledge, collaboration, and learning cultures foster organizational intelligence?," *Journal of Organizational Change Management*, Vol. 33 No. 7, pp. 1329–1354. <https://doi.org/10.1108/JOCM-02-2020-0052>.
- Kucharska, W., and Bedford, D.A.D. (2023a), *The Cultures of Knowledge Organizations: Knowledge, Learning, Collaboration (KLC)*, Emerald.
- Kucharska, W., and Bedford, D.A.D. (2023b), "The KLC Cultures, Tacit Knowledge, and Trust Contribution to Organizational Intelligence," *Proceedings of the 24th European Conference on Knowledge Management*. Lisbon, Portugal.
- Kucharska, W., and Erickson, G.S. (2023a), "Tacit knowledge acquisition and sharing, and its influence on innovations: A Polish/US cross-country study," *International Journal of Information Management*, Vol. 71, 102647. <https://doi.org/10.1016/j.ijinfomgt.2023.102647>
- Kucharska, W., and Rebelo, T. (2022a), "Knowledge sharing and knowledge hiding in light of the mistakes acceptance component of a learning culture- knowledge culture and human capital implications", *The Learning Organization*, Vol. 29 No. 6, pp. 635-655. <https://doi.org/10.1108/TLO-03-2022-0032>
- Kucharska, W., and Rebelo, T. (2022b), *Transformational leadership for researcher's innovativeness in the context of tacit knowledge and change adaptability*. *International Journal of Leadership in Education*. <https://doi.org/10.1080/13603124.2022.2068189>.
- Kucharska, W., Kucharski, M., and Rehman, H.U. (2022), "Transformational leadership and acceptance of mistakes as a source of learning: Poland- USA cross-country study. Gender, risk, position, and industry view," *Proceedings of the 18th European Conference on Management Leadership and Governance*, Lisbon, Portugal, pp. 238-246.
- Plous, S. (1993), *The psychology of judgment and decision making*. McGraw-Hill.
- Samhan, N., Treur, J., Kucharska, W., and Wiewiora, A. (2023), *An Adaptive Network Model Simulating the Effects of Different Culture Types and Leader Qualities on Mistake Handling and Organisational Learning*, in: Cherifi, H., Mantegna, R.N., Rocha, L.M., Cherifi, C., Micciché, S. (eds) *Complex Networks and Their Applications XI. COMPLEX NETWORKS. Studies in Computational Intelligence*, vol. 1077. Springer, Cham. https://doi.org/10.1007/978-3-031-21127-0_19
- Shih, Y.F., and Alessi, S.M. (1993), "Mental models and transfer of learning in computer programming," *Journal of Res. Computer Education*, Vol. 26 No. 2, pp. 154–175.
- Thomas, A.K., and Millar, P.R. (2011), "Reducing the Framing Effect in Older and Younger Adults by Encouraging Analytic Processing," *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, Vol. 67B No. 2, pp. 139–49. <https://doi.org/10.1093/geronb/gbr076>.

- Tversky, A., and Kahneman, D. (1981), The Framing of decisions and the psychology of choice. *Science*, Vol. 211 No. 4481, pp. 453–58. <https://doi.org/10.1126/science.7455683>
- Vazquez, M., Liz, M., and Aracil, J. (1996), "Knowledge and reality; some conceptual issues in system dynamics modeling," *System Dynamics Review*, Vol. 12 No. 1, pp. 21- 37.

Quantitative Analyses of the Role of Relational Capital on Absorptive Capacity in Knowledge-intensive SME's

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Abstract: The research aimed to measure the relational capital influence (RC) on absorption capacity in knowledge-intensive companies. The direct relationship between the different components of relational capital and absorption capacity was analysed through a model of structural equations of partial least squares (PLS-SEM), tested in SmartPLS. This method was chosen for the following reasons: the use of SEM-PLS allows testing causal paths between second-order latent variables, and in addition to offering extensive and flexible causal modelling resources, the technique is recommended for more complex models, with constructs composed of a greater number of variables and with a smaller number of data, as observed in this research. The method is also justified because this research is based on a composite measurement model with a reflective design approach, which means there are correlations between indicators and dimensions. The SmartPLS 3.0 Software was used to carry out the global model evaluation and measurement and structural model evaluation steps. These analyses were conducted in a sample of 174 small and medium-sized technology enterprises (SMEs) that are part of different innovation networks in Brazil. This study highlights that the development of relational capital is supported by collaborative relations of cooperation, trust, communication, and resources invested by enterprises established in different networks. The proposed statistical model allowed proving the relationship factors that help strengthen the relations between the network actors that facilitate the transfer of knowledge. This relationship still needs to be investigated, especially for small and medium-sized knowledge-intensive companies in emerging countries like Brazil. The research conclusion supported the research hypothesis and proved that relational capital is an independent variable that directly and positively influences the absorption capacity process. This study, quantitatively combining the external perspective of relational capital and the internal organisational dimension of absorption capacity, provides valuable information about using quantitative methodologies to explore intangible organisational resources to promote innovation.

Keywords: Quantitative analyses; Structural Equation Modelling; Relational Capital; Absorption Capacity; knowledge-intensive SME's.

1. Introduction

Quantitative research is a powerful tool for managers and organisations seeking to understand the relationships between theories and their market dynamics. It is used to support and underpin the definition of organisational strategies (Bryman, 2016). Thus, in this study we propose to measure the influence and direct relationship between the different components of relational capital (RC) and knowledge absorption capacity (ACAP) in knowledge-intensive companies that are part of innovation ecosystems in Southern Brazil. To test these relationships, we utilized the statistical technique of structural equation modelling with partial least squares estimation (PLS-SEM) in the SmartPLS software.

We opted for the use of PLS-SEM because it is a technique capable of estimating complex models with causal relationships between constructs and for its usability in research in social sciences and business administration (Henseler, Hubona & Ray, 2016). Additionally, the technique is appropriate in situations where the theory supporting causal relationships still lacks exploratory studies (Bido & Da Silva, 2019), as is the case with the

relationships proposed in this study. Finally, this type of analysis allows the results to support decision-making in the business environment (Sekaran & Bougie, 2016).

This article brings contributions to the discussion about the influence of RC factors as a knowledge asset that precedes ACAP (García & Bounfour, 2014; Buenechea-Elberdin et al., 2018), being recognized as an intangible resource and a source of connectivity and innovation in a technological-intensive environment (Ordóñez de Pablos & Edvinsson, 2021). It also provides valuable knowledge on the use of quantitative methodologies for exploring intangible organisational resources.

We have highlighted the existence of opportunities for empirical research that analyses the interrelationship between relational capital and knowledge in dynamic sectors, such as technology companies (Peces & Trillo, 2023). The main challenge for studying intangible factors in organisations, such as relational capital, is to understand how to convert the knowledge originating in the organisation's networks of relationships into new capabilities and knowledge resources (Edvinsson, 2013).

Our findings also enrich the discussions on quantitative research, which supports the analysis of direct and complex relationships, such as in the case of knowledge absorption capability (ACAP). They also expand ongoing research on the role of intangible resources and capabilities in creating competitive advantage (Kashosi et al., 2020), thus contributing to the growing literature on the Knowledge-Based View (KBV) (Flatten et al., 2011, Apriliyanti & Alon, 2017).

2. Literature Synthesis and Hypotheses Development

Relational Capital (RC) is an intangible resource and a component of intellectual capital that can explain the value of an organisation's relationships with its environment (Edvinsson & Malone, 1998, Stewart, 1998). The concept of RC that guides this research is based on the understanding that companies are not an isolated system but belong to an interconnected system that depends on their relationships with the external environment (Knight, 1999). Thus, the RC construct is perceived as an intangible resource formed from the relationships that the company has with the external environment, such as its strategic alliances, cooperative systems, and collaborative relationships of trust among suppliers, customers, competitors, and entities such as universities, associations, public and governmental agencies (Knight, 1999; Kianto, Andreeva & Pavlov, 2013; Garcia & Bounfour, 2014; Buenechea-Elberdin, Kianto & Sáenz, 2017).

Establishing interorganisational relationships can potentiate the creation of wealth from other intangible assets, such as research and development (R&D) and human capital (Kianto, Andreeva & Pavlov, 2013). Developing RC generates close interaction between alliance partners and provides an effective channel for organisational learning, knowledge accumulation and sharing, resulting in better performance for companies (Yoo, Sawyerr & Tan 2016 and Liu, Wang & Su 2023).). Furthermore, it reduces knowledge ambiguity, which, in turn, helps companies improve their knowledge acquisition (Ho, Ghauri & Kafouros, 2019).

The Absorptive Capacity is analysed from the epistemological perspective of the Resource-Based View (RBV) theory proposed by Barney (1991) which discusses the specific resources of a firm for finding competitive advantages. Defined by Cohen and Levinthal (1990) as the ability of a firm to recognize the value of new external information, assimilate it, and apply it for commercial purposes, it is essential for its innovative capabilities. The concept was revisited and expanded by authors Zahra and George (2002) who defined ACAP as a set of organisational routines and processes through which firms acquire, assimilate, transform, and apply knowledge with the purpose of producing a dynamic and sustainable capacity.

The relationship between the constructs of Relational Capital (RC) and Absorptive Capacity (ACAP) have been the focus of different research, such as those conducted by Lu and Wang (2012), García and Bounfour (2014), Ho and Wang (2015), Yoo, Sawyerr and Tan (2016), Terstriep and Lüthje (2018), and Ho, Ghauri and Kafouros (2019). These studies consider the Knowledge Absorption (ACAP) process as a dependent variable of RC.

This research aims to validate the research hypothesis and advance the understanding of Relational Capital as an intangible resource through external relationships capable of directly and positively influencing the process of acquiring, assimilating, transforming, and applying knowledge obtained in the interorganisational environment of companies. Based on the theoretical context presented, the hypothesis of this research is established: **H1 - Relational Capital positively influences Absorptive Capacity.**

3. Methods

3.1 Research Settings

Our research used quantitative data collection in Brazilian technology-based companies (TBCs). These companies participate in different innovation ecosystems, public or private, called technology clusters, parks and/or technological poles, incubators and/or associations of technology companies. Researching TBCs is justified because their dynamics of operation and activities characterize them as knowledge-intensive companies (Tseng, Pai & Hung, 2011; Peces & Trillo, 2023). This intensity of knowledge in their systems and management practices, such as in their activities, processes, products, people, and markets of operation, makes knowledge the main strategic resource capable of establishing sustainable competitive advantage (Neves et al., 2014).

Emerging markets, such as Brazil, are countries with characteristics of developed markets of industrialized countries but which do not meet the necessary conditions to be classified as developed countries (Tajpour et al., 2022). The overall nature of technology companies in Brazil is based on the management, application, analysis, and evaluation of internal and external information to generate knowledge and innovations. However, this can only be achieved if these companies can institutionalize the knowledge absorption process within them. Knowing that most technology companies operate in innovation ecosystems (technology parks, incubators, associations, etc.), relational capital becomes an essential element for acquiring knowledge from the external environment (see Ho, Ghauri, and Kafouros, 2019).

3.2 Sample and Data Collection

Our research targets managers who work in companies with more than 20 employees and hold strategic level positions (CEOs and directors) or managerial positions (HR or innovation managers). We used Dillman's (2007) principles to design and direct our data collection approach. Our efforts included the following steps. First, we developed research questions to ensure that wording and order did not create bias in the data. Additionally, we provided explicit instructions (e.g., answer the survey based on the current situation of your company) to reduce potential social desirability bias. Second, to elicit responses, our email to the interviewees communicated the research context and study methodology in simple and transparent language. Finally, we ran a survey built on the Google Forms tool that started with the disclosure of the interviewee's participation consent and the assurance of respondent data privacy. In other words, all interviewee data was kept confidential. To ensure anonymity, all reported results were statistically aggregated.

We sent the survey to 708 Brazilian TBCs located in ecosystems of three states (Santa Catarina, Paraná, and Rio Grande do Sul), obtaining 174 responses with a response rate of 24.6%. The sample complies with the precepts of Hair et al. (2009), who suggest as a general rule that, to perform data analysis in Structural Equation Modeling (SEM), it is necessary to have at least five times more observations than the number of variables to be analysed. In this case, the minimum number of valid questionnaires would be 125, a which was exceeded.

The companies in the sample operated in different technology sectors, mostly in software and IT (52.5%), and in segments such as artificial intelligence, nanotechnology, biotechnology, agribusiness, education, and industrial automation. The average age of the companies was 9.29 years (SD = 10.62), with an average of 30.86 (SD = 77.03) full-time employees. These data represent the diversity of companies that composed the sample, which enriches the research results.

3.3 Measurement and Validation of Constructs

We employed previously validated measures for all variables, Flatten et al. (2011) and Flatten, Greve, and Brettel (2011). The research instrument began with an English language questionnaire based on previous research. Then, we translated the questionnaire into Portuguese, to avoid cultural bias and ensure conceptual equivalence. We recruited 10 subject matter experts (i.e., scholars of innovation management and executives residing in Brazil) for a pilot study. We asked them to evaluate the survey items to ensure validity. This approach ensured that the survey items were a procedurally validated accurate representation.

The questionnaire was divided into three blocks, containing 25 questions. The first block consisted of 5 questions, called characterization and control variables, such as time of activity in the market, number of employees, R&D investments in the last three years, and whether they actively participated in associations, business conglomerates, and/or other forms of interorganisational cooperation, aimed at identifying and

characterizing the sample. The second block included 5 questions capable of measuring relational capital, and the variables were derived from the studies conducted by Andreeva and Garanina (2016), Buenechea-Elberdin, Kianto, and Sáenz (2017), and Yoo Sawyerr and Tan (2016). The third block had 15 questions that measured absorptive capacity and was adapted from the study by Flatten, Greve, and Brettel (2011).

To measure the variables that make up the measurement model (RC and ACAP), we adopted the Likert scale (1 “totally disagree” to 5 “totally agree”), primarily because it is widely used by research in the area of social sciences, see Rhemtulla et al. (2012). Also due to the significant number of verification items proposed in the established and validated model Flatten et al. (2011) be composed of multiple items.

It is noteworthy that the scores of all items in the questionnaire were combined to generate a composite score, which logically measures a unidimensional trait in its entirety, as recommended by Joshi et al. (2015). The variables are of a scalar nature of the continuous type and the questions chosen are considered empirically important, making it possible to measure the opinion of managers on certain situations that classify the constructs. The results themselves constitute a relevant and proven empirical verification, through the results of the statistical tests.

Table 1: Research variables

Construct	Variables	Authors
Relational Capital	Does our company have a good relationship with its stakeholders, such as companies in a common conglomerate, competitors, suppliers, customers, universities, consultants, or government institutions?	Andreeva and Garanina (2016), Buenechea-Elberdin, Kianto and Saenz (2017) and Yoo Sawyerr and Tan (2016)
	Does our company collaborate with its stakeholders to achieve specific sector goals?	
	Does our company actively cooperate among companies in the same sector and with its stakeholders?	
	Does our company communicate frequently with its stakeholders to share information and knowledge about the sector?	
	Does our company invest resources to develop a successful alliance (collaborative network)?	
Absorptive – Acquisition Capacity	Does our company seek information through joint projects with companies and research institutions beyond our sector?	Flatten, Greve and Brettel (2011), Flatten <i>et al.</i> (2011)
	Is the search for relevant information about our sector a daily activity in our company?	
	Does our company's management encourage employees to use sources of information about our sector?	
	Does our company's management expect employees to seek information from different sectors?	
Absorptive – Assimilation Capacity	In our company, are new information and ideas communicated between different areas (teams/sectors/units/departments)?	
	Does the management of our company support collaboration between different areas (departments) to solve problems?	
	In our company, is there a fast flow of information, so if one unit of the company obtains important information, it communicates that information quickly to all different areas?	
	In our company, are there regular meetings to exchange information, seek solutions, and share achieved results?	
Absorptive – Transformation Capacity	Do our employees have the ability to structure and use knowledge collected from external sources?	
	Are our employees accustomed to absorbing new knowledge, as well as making it available and preparing it for other purposes?	
	Do our employees associate existing knowledge with new ideas and/or insights?	
	Are our employees able to apply new knowledge to their daily work routines and practices?	

Construct	Variables	Authors
Absorptive – Application Capacity	Does the management of our company support the development of prototypes (product/service testing) based on newly acquired knowledge?	
	Does our company regularly reconsider technologies and adapt them according to newly acquired knowledge?	
	Does our company have the ability to work more effectively by adopting new technologies?	

Source: Elaborated based on the studies of Andreeva and Garanina (2016), Buenechea-Elberdin, Kianto and Sáenz (2017), Yoo Sawyerr and Tan (2016), Flatten et al. (2011), and Flatten, Greve and Brettel (2011)

3.4 Construct and Method Validity

For data analysis, we organized, coded, and tabulated the data in Excel spreadsheets for statistical analysis and interpretation, following the guidelines of Hair et al. (2009). Frequency and percentage checks for numerical data and normal distribution of variables were performed using the Statistical Package for Social Science (SPSS) software version 24.0.

We also used structural equation modelling (SEM) with partial least squares estimation (PLS-SEM) supported by SmartPLS software, version 2.0. First, we evaluated the measurement model, where we observed convergent validity (average variance extracted - AVE), internal consistency (composite reliability and Cronbach's alpha), and discriminant validity (Fornell-Larcker criterion). The second step was the evaluation of the structural model, where we observed the significance of correlations and regressions through the Student's t-test.

4. Descriptive Analyses using PLS-SEM

The evaluation of the measurement model aims to assess and ensure the reliability and validity of each analysis construct, specifying the relationships between a construct and its indicators and observing if they are indeed representative. For this research, we followed the criteria proposed by Hair et al. (2014), Ringle, Da Silva and Bido (2014), Henseler, Hubona and Ray (2016), and Bido and Da Silva (2019).

The constructs were evaluated as reflective indicators, and the model assessment followed the criteria and sequence suggested by Ringle, Da Silva, and Bido (2014). The first aspect observed was the convergent validity and reliability of the constructs (Hair et al., 2014), through the calculation of the Average Variance Extracted (AVE > 0.50), Composite Reliability (CR > 0.7), and Cronbach's Alpha (CA > 0.6 and 0.7), and the analysis of the Fornell-Larcker Criterion (Henseler, Hubona, & Ray, 2016), presented in Table 2.

Table 2: Correlation matrix between LV (n=174) Fornell-Larcker Criterion

(a) 1 st Order Variables	Acquisition	Assimilation	Transformation	Application	RC
Acquisition	0.772				
Assimilation	0.551	0.805			
Transformation	0.482	0.591	0.877		
Application	0.516	0.544	0.593	0.858	
Relational Capital (RC)	0.484	0.415	0.419	0.370	0.809
Average Variance Extracted (AVE)	0.595	0.648	0.769	0.737	0.654
Composite Reliability (CR)	0.854	0.880	0.930	0.894	0.904
Cronbach's alpha (CA)	0.771	0.817	0.900	0.821	0.867
<hr/>					
(b) LV of the Structural Model	ACAP	RC			
Absorption capacity (ACAP)	0.811				

(a) 1 st Order Variables	Acquisition	Assimilation	Transformation	Application	RC
Relational Capital (RC)	0.521	0.809			
Average Variance Extracted (AVE)	0.658	0.654			
Composite Reliability (CR)	0.885	0.904			
Cronbach's alpha (CA)	0.912	0.867			

The values presented satisfactory results, as the Cronbach's Alpha, for both the variables and constructs, showed values above 0.70, as recommended by Hair et al. (2014). The assessment of Composite Reliability (CR) for each construct also showed adequate results, that is, the values were above 0.80, indicating the reliability of the model. We confirmed the convergent validity of the variables, as the values of Average Variance Extracted (AVE) were above 0.5, according to the criteria of Hair et al. (2014) and Henseler, Ringle, and Sinkovics (2009). The results shown in Table 2 present satisfactory values for the assumptions, thus it is assumed that the model converges to a satisfactory result.

The Discriminant Validity (Fornell-Larcker criterion) was considered adequate, as the results of the square root of the AVE of each construct were higher than the correlations with other constructs. The correlations among the variables were smaller than the square root of the AVE, thus meeting the assumptions, as recommended by Hair et al. (2014).

The second step of the analysis was the evaluation and analysis of the structural model. First, we assessed the effect of the Pearson coefficient, as recommended by the Cohen (1988), which considers $R^2 = 2\%$ as a small effect, $R^2 = 13\%$ as a medium effect, and $R^2 = 26\%$ as a large effect. The results showed values of 27.2%, which are higher than 26%, indicating a large effect and guaranteeing the quality of the proposed model, as presented in Table 3.

Table 3: Pearson coefficient effect (R^2)

	(R^2)	%	Cohen (1998)
Relational Capital positively influences absorption capacity	0.272	27.2	Large effect

Finally, we evaluated the structural model by observing the significance of correlations and regressions through the Student's t-test. The Relational Capital (RC) was analysed as an exogenous and independent construct.

The tests for hypothesis (H1) confirmed that RC is positively related and influences ACAP, and this hypothesis relationship presented a structural coefficient (β) value of 0.521. This means that RC positively influences ACAP by 52%, with a standard error of 0.053 and very high significance ($p < 0.00$). The T-test value was 10.249, which means that if there is a variation in the company's Relational Capital, it affects the Absorptive Capacity positively. The effect size (f^2) was also evaluated based on Cohen's (1988) proposal, and this hypothesis had a large (f^2) value of 0.373.

Table 4: Hypothesis analysis

Hypothesis	Relationship	Structural Coefficient (β)	Standard error	t-Value (T Test)	Effect of relationships (f^2)	P-Value	Situation
H1+	Relational C -> ACAP	0.521	0.053	10.249	0.373	0.000	Supported

The statistical tests conducted on the structural and measurement models allowed us to conclude that H1 was supported. The findings indicate that the higher the levels of RC in companies participating in innovation ecosystems, the greater the chances that these companies will access and apply the knowledge available in the external environment.

In this sense, it is possible to infer that the sources of knowledge generated through this capital precede the Knowledge Absorption Capacity (ACAP). That is, the greater the collaboration, cooperation, and communication

relationships established by companies with their stakeholders (partner companies in a common conglomerate, suppliers, customers, universities, consultants or government institutions), the greater the sources of knowledge accessed, thus driving the ACAP process that resides in practical actions of acquiring knowledge from the external environment, and assimilating, transforming, and applying this knowledge for commercial purposes (Zahra & George, 2002).

This hypothesis confirms that strong RC influences and strengthens the process of ACAP, the beta value of 52% confirms the strength of this hypothesis's relationship. Similar evidence was found in the research of Lu and Wang (2012) in the context of industries.

5. Detecting Causal Relationships using Structural Equations

The statistical analyses performed through structural equation modelling (SEM) with partial least squares estimation (PLS-SEM) allowed us to confirm and support the proposal of this research to analyse the positive relationship and influence of Relational Capital on ACAP. The study findings also allowed us to infer about the importance of relational capital on absorptive capacity in the context of the investigated organisations. We still highlight that this relationship can be strengthened based on the trust that exists between organisations and their stakeholders, through the strong collaboration and cooperation strategies in the technology sector, through the established communication process in the sharing of information and knowledge, and through the use of various resources in forming alliances.

The research expands and strengthens the proposal that statistical methods are useful for understanding how relationships between RC factors can be responsible for reducing the ambiguity of knowledge obtained in the interorganisational environment, which in turn influences and improves the ACAP process, contributing to strategic management processes and decisions. Thus, it can be assumed that collaborative environments, such as innovation ecosystems, enable interaction, cooperation, and collaboration among companies, which, by developing knowledge capabilities, can take advantage of these resources to remain competitive in the market.

6. Main Findings and Limitations

This research contributes to advancing quantitative research in the knowledge management field by filling the gaps that highlight the antecedent factors and the processes of knowledge absorption. The statistical relationships between the RC and ACAP constructs were confirmed, considering the context of technology companies in emerging countries, which remain underexplored factors in the literature.

We also consider that it is relevant for company managers operating in an emerging economy and a dynamic, complex, and highly technological mobility environment, such as the technology sector, to explore the intangible resources of RC as a strategy to mitigate barriers to innovation. Additionally, this research presents statistical data that demonstrate the importance of companies in recognizing the value of knowledge from external sources for acquiring, assimilating, transforming, and applying this knowledge in innovations.

As limiting factors, we may mention the number of respondent companies from each ecosystem, which made it impossible to conduct a comparative analysis between companies or ecosystems, or even the position of companies in the network, for example. We also highlight a limitation regarding the cross-sectional approach in the data collection stage, which limits the analysis of different phenomena occurring in organisational environments after data collection, something that could interfere with results and analysis.

Considering the limitations, we propose that future studies use other software and/or statistical analysis models to deepen research on RC, conducting studies to understand the relationships between variables from different perspectives. We also consider it pertinent for new research to analyse and compare low-tech clusters with high-tech ones, expanding research on the importance of Relational Capital and its impact on firm capabilities.

References

- Andreeva, T. & Garanina, T. (2016). Do all elements of intellectual capital matter for organizational performance? Evidence from Russian context. *Journal of Intellectual Capital*, 17(2), 397-412.
- Apriliyanti, I. D., & Alon, I. (2017). Bibliometric analysis of absorptive capacity. *International Business Review*, 26(5), 896-907.
- Barney, J. (1991). Firm Resources and Sustained Competitive Advantage. *Journal of Management*, 17(1), 99-120. doi:10.1177/014920639101700108

- Bido, D. & Da Silva, D. (2019). Smart PLS 3: especificação, estimação, avaliação e relato. *Administração: Ensino e Pesquisa*, [s.l.], 20(2), 1-31.
- Bontis, N. (1996). There's a price on your head: managing intellectual capital strategically. *Business Quarterly*, [s.l.], 60, 40-78.
- Bryman, A. (2016). *Social research methods*. Oxford university press.
- Buenechea-Elberdin, M., Kianto, A., & Sáenz, J. (2017). Intellectual capital drivers of product and managerial innovation in high-tech and low-tech firms. *R&D Management*, 48(3), 290–307. doi:10.1111/radm.12271
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences*. 2. ed. Hillsdale: Erlbaum.
- Cohen, W. M., & Levinthal, D. A. (1990). Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35(1), 128. doi:10.2307/2393553
- Edvinsson, L. & Malone, S. M. (1998). *Capital Intelectual: concretizar valor verdadeiro da sua empresa, encontrando o seu poder intelectual Invisível*. 1. ed. Nova Iorque: Harper Collins Publishers, Inc.
- Edvinsson, L. (2013). IC 21: reflections from 21 years of IC practice and theory. *Journal of Intellectual Capital*, 14(1), 163–172. doi:10.1108/14691931311289075
- Flatten, T. C., Engelen, A., Zahra, S. A., & Brettel, M. (2011). A measure of absorptive capacity: scale development and validation. *European Management Journal*, 29(2), 98-116.
- Flatten, T. C., Greve, G. I., & Brettel, M. (2011). Absorptive capacity and firm performance in SMEs: The mediating influence of strategic alliances. *European Management Review*, 8(3), 137–152. doi:10.1111/j.1740-4762.2011.01015.x
- García, A. B., & Bounfour, A. (2014). Knowledge asset similarity and business relational capital gains: evidence from European manufacturing firms. *Knowledge Management Research & Practice*, 12(3), 246–260. doi:10.1057/kmrp.2014.2
- Hair J. F., Jr., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2009). *Análise multivariada de dados*. Porto Alegre: Bookman.
- Hair J. F., Jr., Sarstedt, M., Hopkins, L., & G. Kuppelwieser, V. (2014). Partial least squares structural equation modeling (PLS-SEM). *European Business Review*, 26(2), 106–121. doi:10.1108/ebrev-10-2013-0128
- Ho, M. H.-W., & Wang, F. (2015). Unpacking knowledge transfer and learning paradoxes in international strategic alliances: Contextual differences matter. *International Business Review*, 24(2), 287–297. doi: 10.1016/j.ibusrev.2014.08.002
- Henseler, J., Ringle, C. M., & Sinkovics, R. R. (2009). The use of partial least squares path modeling in international marketing. In R. R. Sinkovics & P. N. Ghauri (Eds.). *New challenges to international marketing*. Bingley, UK: Emerald Group. doi:10.1108/S1474-7979(2009)0000020014
- Henseler, J., Hubona, G., & Ray, P. A. (2016). Using PLS path modeling in new technology research: updated guidelines. *Industrial Management & Data Systems*, 116(1), 2–20. doi:10.1108/imds-09-2015-0382
- Ho, M. H.-W., Ghauri, P. N., & Kafourous, M. (2019). Knowledge Acquisition in International Strategic Alliances: The Role of Knowledge Ambiguity. *Management International Review*. doi:10.1007/s11575-019-00383-w
- Joshi, A., Kale, S., Chandel, S., & Pal, D. K. (2015). Likert scale: Explored and explained. *British journal of applied science & technology*, 7(4), 396.
- Kashosi, G. D., Wu, Y., Getele, G. K., Bianca, E. M., & Irakoze, E. (2020). The Role of Absorptive Capacity and Firm Openness Strategies on Innovation Performance. *Information Resources Management Journal*, 33(4), 1–16. doi:10.4018/irmj.2020100101
- Kianto, A., Andreeva, T., & Pavlov, Y. (2013). The impact of intellectual capital management on company competitiveness and financial performance. *Knowledge Management Research & Practice*, 11(2), 112–122. doi:10.1057/kmrp.2013.9
- Knight, D. J. (1999). Performance measures for increasing intellectual capital. *Strategy & Leadership*, 27(2), 22–27. doi:10.1108/eb054632
- Liu, C.-L., Ghauri, P. N., & Sinkovics, R. R. (2010). Understanding the impact of relational capital and organizational learning on alliance outcomes. *Journal of World Business*, 45(3), 237–249. doi: 10.1016/j.jwb.2009.09.005
- Liu, X., Wang, W., & Su, Y. (2023). Leveraging Complementary Resources through Relational Capital to Improve Alliance Performance under an Uncertain Environment: A Moderated Mediation Analysis. *Sustainability*, 15(1), 310.
- Lu, Y. K & Wang, E. (2012). *Inter-Firm Cooperation and IOS Deployments in Buyer-Supplier Relationships: a Relational View*. [s.l.: s.n.].
- Neves, S. M., da Silva, C. E. S., Salomon, V. A. P., da Silva, A. F., & Sotomonte, B. E. P. (2014). Risk management in software projects through Knowledge Management techniques: Cases in Brazilian Incubated Technology-Based Firms. *International Journal of Project Management*, 32(1), 125–138. doi: 10.1016/j.ijproman.2013.02.00
- Ordóñez de Pablos, P., & Edvinsson, L. (Eds.). (2020). *Intellectual capital in the digital economy (1st ed.)*. Routledge.
- Peces, MDC, & Trillo, MA (2023). *Relational Capital in the Technology Sector: An International Strategic Model*. *Sustainability*, 15 (5), 4351.
- Rhemtulla, M., Brosseau-Liard, P. É., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological methods*, 17(3), 354.
- Ringle, C. M., Silva, D., & Bido, D. D. S. (2014). Modelagem de equações estruturais com utilização do SmartPLS. *Revista Brasileira de Marketing*, 13(2), 56–73. doi: 10.5585/remark.v13i2.2717
- Stewart, T. (1998). *O capital intelectual: a nova riqueza das organizações*. São Paulo: Campus.

- Tajpour, M., Hosseini, E., Mohammadi, M., & Bahman-Zangi, B. (2022). The effect of knowledge management on the sustainability of technology-driven businesses in emerging markets: The mediating role of social media. *Sustainability*, 14(14), 8602.
- Terstriep, J. & Lüthje, C. (2018). Do Clusters as Open Innovation Systems Enhance Firms Innovation Performance? *European Institute for Advanced Studies in Management*, [s.l.].
- Tseng, C., Chang Pai, D., & Hung, C. (2011). Knowledge absorptive capacity and innovation performance in KIBS. *Journal of Knowledge Management*, 15(6), 971–983. doi:10.1108/13673271111179316
- Yoo, S.-J., Sawyerr, O., & Tan, W.-L. (2016). The Mediating Effect of Absorptive Capacity and Relational Capital in Alliance Learning of SMEs. *Journal of Small Business Management*, 54, 234–255. doi:10.1111/jsbm.12299
- Zahra, S. A. & George, G. (2002). Absorptive capacity: A review, reconceptualization, and extension. *Academy of Management Review*, 27(2), 185-203.
- Sekaran, U., & Bougie, R. (2016). *Métodos de pesquisa para negócios: uma abordagem de desenvolvimento de habilidades*. John Wiley & filhos.

Towards a Comprehensive Model for CSR in Iran: A Systematic Literature Review

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Abstract: Although the start of the studies on corporate social responsibility (CSR) goes back to the 1960s, it has not been long since businesses have paid attention to it in Iran. In this study, English and Persian articles have been reviewed to explore the CSR models which are being used in both contexts to understand the crucial dimensions of their models. Having two different CSR models, English/Persian, and their dimensions, allows a comparative approach and some recommendations for the Iranian context to benefit more from CSR activities. In this regard, a systematic literature review of CSR models in Iran was conducted using secondary data with a qualitative approach and practical purpose. At first, the focus was on English articles in the field of CSR in the period from 2018 to 2022, and then the review of Persian articles in the same field at the same period of time. Starting with 2013 English articles and 733 Persian ones, excluding inappropriate articles based on Tranfield et al. (2003) suggestion in four steps, a final sample of 23 English and 16 Persian articles was obtained. The classification of the extracted codes showed 21 CSR dimensions in English, and 13 ones for Persian models, while 9 of them had overlap in both. The main finding of the article was knowing the point that although there are similarities between the dimensions of the CSR models being used in Iran and other countries, the differences can be divided into two categories: The first group of the differences, which can be caused by the culture, laws, religions, and perceptions of CSR, and changing them if not impossible, but very difficult and maybe not necessary. On the other hand, taking steps to reform the second group of differences requires some actions from the policymakers, government, and businesses.

Keywords: Corporate Social Responsibility; Social Responsibility; CSR; Models of CSR; Dimensions of CSR

1. Introduction

Recently, the concept of Corporate Social Responsibility (CSR) has attracted a huge deal of research attention with increasing importance. There are obligations in companies to the community, which are beyond the revenues of shareholders. Businesses need to be economically competitive, environmentally sustainable, and socially responsible irrespective of their type and size (Dawit et al, 2021). The evolving environmental, economic, and social challenges of society lead to more complicated issues like climate change, poverty, and unemployment. Such challenges are massive political and economic power throughout this century as well as innovations and driving technological changes (Li et al, 2016). Although, different investigations have been performed in Iran on CSR covering various economic sectors and industries, there are still several non-answered questions about CSR in Iran. In the present study, it was attempted to respond to some of these questions through a systematic review of CSR in the literature in Iran. For instance: Do Iranian companies and industries have a unique and distinct approach from those in Western countries? How is CSR viewed in the Iranian context? What unique dimensions can be recognized in the Iranian context to inform a more globalized CSR view? In the present study, it was attempted to respond to some of these questions through a systematic review of CSR in the literature in Iran.

The paper was set as follows. In section 2, a literature review of CSR models in the world is described. In section 3, our methodology is reviewed including the description and case selection, data collection, and data coding procedure. Section 4 presents our findings regarding two various models. The discussion and conclusions of the paper are presented in section 5.

2. Literature review

2.1 CSR and corporate competitiveness

Several countries in the world try to improve their competitiveness via responsible competitiveness policies (Poljašević, 2012). Albareda et al (2007) considering the European countries' method of CSR, identified four

government models of CSR fostering including the business in the community model, the partnership model, citizenship, and sustainability model, and the agora model.

Midttun et al (2006) identified five European models of fostering CSR by governments based on the earlier work of Sapir (2005). They include Nordic, Anglo-Saxons, Continental 1, Mediterranean, and Continental 2 models.

Maon et al (2015) divided European countries into five classes based on CSR initiatives. It was suggested that the regional background of corporate actors echoes the different orientations and variations for developing and proposing CSR-based initiatives.

There are differences in CSR models in the USA and Europe associated with public perception, corporate culture, and structure, as well as the legal environment in these countries. Sorokivska et al (2019) classified three major models of CSR, namely American, European, and Japanese considering the noteworthy differences in comprehension of CSR among contemporary entrepreneurs and scholars in the United States and Europe, driven by historical, social, and cultural features.

Four CSR models were analyzed by Pustokhin and Pustokhina (2020) including the European, the American, the Canadian, and the British national model of CSR. Each of them possesses specific peculiarities to differentiate one national model from another. Based on the data discussed, through a brief review a general idea can be made for the studied CSR models.

2.2 CSR in Iran

Different investigations have been performed in Iran on CSR covering various economic sectors and industries (Kashanipour et al., 2018; Talebnia et al., 2018; Ghorbani et al., 2020; Sajasi et al. 2019; Fatourehchi et al., 2020; Sobhani et al., 2020; Alavi et al., 2020; Darini, 2020; Raoufimaram et al., 2021; Khalifehsoltani et al, 2021).

CSR exists in Iran as an Islamic and national robust tradition through an institutional mechanism known as 'Waqf' (foundation). It is restricted to the building of schools, mosques, hospitals and clinics, and other charitable centers. Though, the modern definitions have been recently propounded for CSR in Iran by some government officials, businesses, NGOs, and academic communities. With the development of companies and the growth of competition in the business environment, CSR was noticed in managerial strategies and processes (Heidarzadeh Hanzaee and Rahpeima, 2013).

The World Sustainable Development Index (2017) ranked Iran as the 89th country out of 157 (Environmental Protection Agency, 2016) in terms of lack of appropriate comprehension and development, disregard for the concept of "social responsibility, and uncontrolled growth". It was proven as the most unparalleled principle and important strategy for sustainable development (Chavoshbashi, 2008). According to Minaei et al (2020), performances and credibility have been undermined by overlooking the environmental social responsibility dimensions of sustainable development in governmental organizations in developing countries such as Iran.

2.3 Research objectives and gaps

In each country, the importance and comprehension of CSR can vary owing to the involved cultural aspects (Ho et al, 2012; Ringov and Zollo, 2007). The culture of a nation has a fundamental role in the environmental and social challenges of the companies (Horak et al, 2018) and shapes the expectations of the stakeholders regarding CSR issues (García-Sánchez et al, 2016). Koprowski et al (2021) found that the community, employees, corporate governance, and the environment are affected by the cultural differences between countries in business activities. Poljašević (2012) showed that choosing a specific approach and model to encourage CSR at the national level is based on several factors including the historical traditions, institutional, political, and social structure, and other civil associations in the society.

Considering the role of culture on CSR and the lack of novelty of the subject in Iran, the present work was performed to present a systematic literature review on the CSR models in Iran and compare them to other CSR models in the American and European texts.

2.4 Research questions

We defined three questions to achieve an overview of the CSR models, as follows:

RQ1. Which CSR models are examined mostly in English articles? And what are their dimensions?

RQ2. Which CSR models are examined mostly in Persian articles? And what are their dimensions?

RQ3. What are the differences and similarities between the dimensions of the CSR models in Persian and English articles?

3. Methodology

In the present work, the systematic review (SR) method was used. SRs are based on evidenced for literature review in the field. According to Petticrew and Roberts (2008), the method is useful to map out the areas of uncertainty and identify where no relevant or little research was performed, and where new studies are required (Fink, 1998; Becheikh et al, 2006).

Although, there are some narrative literature reviews on CSR models, we could not find any systematic review of the CSR models, particularly in Iran. We conducted a systematic review based on the guidelines of Tranfield et al (2003).

3.1 Keywords and search strategy

To initiate searching, a pilot search was performed via a simple string “corporate social responsibility”, and then “social responsibility”, “CSR”, “CSR models” and “dimensions of CSR” in all the potential electronic databases. Then, related conferences and journals publishing research on CSR in English articles were identified. To search Persian articles, we utilized the translation phrases in Persian.

The most important English databases were Cambridge Journal, Emerald Insight, Google Scholar, Oxford Journals, JSTOR, Science Direct, Sage Journals, Springer Link, Scopus database, Scimago, and Elsevier. The Persian databases for searching included Irandoc, ISC, SID, magiran, noormags, Civilica, academia, and Rigest. Our period was limited from “January 2018” to “March 2022”. Regarding the search method and string, the maximum keywords were identified and various search strings were developed for each database. Both English and Persian databases were searched multiple times with various combinations of search strings and keywords.

3.2 Quality of primary studies

3.2.1 English language articles

Here, using the search strings, databases were selected one after the other, and 2013 English studies were retrieved. Then, the relevant studies were selected by reading the titles of the displayed abstracts or results if the title did not appear related. We excluded 1211 irrelevant studies by this manual screening process based on the title, and then, 509 irrelevant articles after reading the abstracts. We chose 383 relevant studies from the chosen databases, which were decreased later to 97 after examining the contents of the studies in multiple databases. Controlling the information of the remained articles was the last step, by which we excluded 74 English studies. Ultimately, 23 English articles remained related to the specified period (Figure 1).

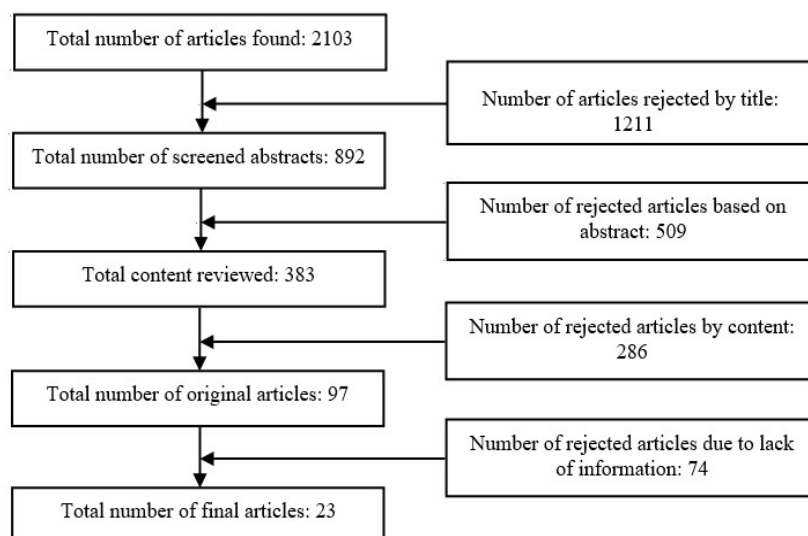


Figure 1: The process of identifying and removing English articles

3.2.2 Persian language articles

First, 733 studies were found among Persian articles, of which 519 contained irrelevant titles, 113 had irrelevant abstracts, and 37 were with irrelevant content. We eliminated 48 articles owing to the absence of information. Finally, 16 Persian articles remained related to the topic during the time (Figure 2).

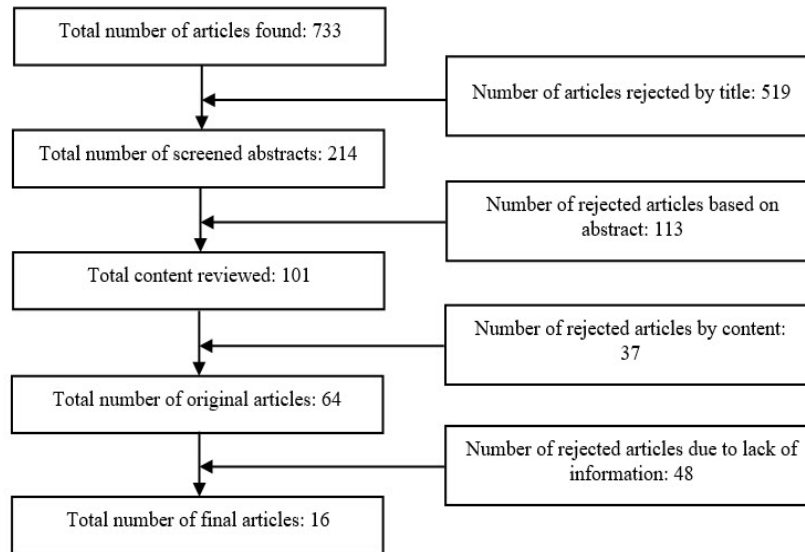


Figure 2: The process of identifying and removing Persian articles

Considering the study of Tranfield et al (2003), two data extraction forms were developed in Microsoft Excel to decrease bias and human error in the systematic review, both for English and Persian studies. We stored the information about the studies including title, publication year, author/s, name of the journal, country of research, online database, and made a research classification scheme. To assess the quality of the studies, we ensured that the chosen studies were published in peer-reviewed indexed journals only.

3.3 Inclusion and exclusion criteria

The inclusion and exclusion criteria in the present work were based on the research question(s) (Tranfield, 2003). Papers irrelevant to the research questions(s) or studies on specific topics providing little direction on the review methodology were excluded, and only articles were included related to the Models of CSR.

3.4 Data extraction

Each paper was carefully read and the dimensions of the CSR were extracted in the Excel files. Then, the extracted dimensions in Persian and English articles were separately classified and compared. Tables 1, 2 show extracted codes from English language articles and Persian ones, respectively.

4. Findings

4.1 General characteristics

First of all, we classified the distribution of publications per year for the period 2018-2022 to find the time period in which much attention was paid toward models of CSR in English and Persian language articles, respectively (Figure 3).

Then we categorized English and Persian articles based on the journals to find which of them has been more active in the field. *“Social Responsibility Journal”* with 4 published English papers is the most prominent in this term, and *“Society and Business Review”*, and *“Hospitality and Tourism Management”* with 2 English papers in the studied take the second place. Among Persian journals, *“Accounting and Auditing Researches”* with 3 published papers, and *“Environmental Education and Sustainable Development”* with 2 Persian publications are in the first and second positions. Besides, the countries that English language articles have more focused on the field are China, the Republic of Korea, and Turkey with 3, 2, and 2 articles, respectively.

Table 1: The codes extracted from English language articles

No.	Extracted codes	Reference
1	environmentally friendly products, energy saving, not using toxic ingredients, and natural resources in danger of depletion, being transparent in corporate environmental reports, committed to developing employees	Le (2022)
2	innovative capability, pollutants emission reduction, institutional environment, green environmental development	Zeng et al (2022)
3	beliefs about climate change	Huang and Lin (2022)
4	human rights, community involvement	Shipton and Dauvergn (2022)
5	customer, employee, community, environment	Bahta et al (2021)
6	economic, social, environmental, governance	Maali et al (2021)
7	environmental and social performance	Hichri and Ltifi (2021)
8	economic, environmental, social	Rossi et al (2021)
9	community and environmental responsibilities	Saenz (2021)
10	regulative, mimetic, normative, investor and community pressures	Famiyeh et al (2020)
11	internal and external CSR	Wang et al (2020)
12	economic, legal, ethical and philanthropic responsibilities	Zainee and Puteh (2020)
13	CSR to social and non-social stakeholders, customers and employees	George et al (2020)
14	economic, ethical, legal and philanthropic CSR	Lee et al (2020)
15	environmental, social, economic, stakeholder and voluntariness dimensions	Su and wanson (2019)
16	ethical, legal and economic CSR	Grover et al (2019)
17	environment, social and governance	Jeffrey et al (2018)
18	economic, social and environmental	Gursoy et al (2019)
19	economic, legal, ethical and philanthropic components	Al Mubarak et al (2019)
20	internal CSR	Gangi et al (2018)
21	contribution to health and education sectors, activities for natural disaster and employees, environmental issues, product/services/statements	Fallah and Mojarad (2019)
22	economic, social and environmental responsibilities	Park (2018)
23	community and environment-oriented social responsibilities	Boğan and Dedeoğlu (2019)

Table 2. The codes extracted from Persian language articles

No.	Extracted codes	Reference
1	environmental sustainability, interaction with social capital, improving the quality of life, economic stability, community safety and security, ethical, charitable and voluntary activities	Raoufimaram et al (2021)
2	economic, social and environmental components, Stakeholders, voluntary activities	Goudarzi and Hoseinishokrabi (2021)
3	environment and public interest, philanthropy, animal protection	Labafi et al (2021)
4	economic, social, political, cultural, legal, moral, philanthropic, and environmental components	Khalifehsoltani et al (2021)
5	legal, social, and moral components	Forughinasab et al (2021)
6	human resources, performance, seek participation, environment	Ghorbani et al (2020)
7	responsiveness, economic components, maintaining social and cultural respects, environmentally oriented, Observance of public rights, upholding Islamic values, central justice	Sobhani et al (2020)
8	business ethics, legal, economic and moral components, charitable activities	Darini (2020)
9	humanitarian, and Innovative social responsibility	Fatourehchi et al (2020)
10	philanthropy, environmental, Media-News	Alavi et al (2020)
11	legal, economic, moral, humanitarian components	Alidadiani and Soleimanpour (2019)
12	economic, legal, altruistic, moral responsibilities	Ghasemnejad et al (2019)
13	legal, economic, moral, humanitarian, environmental, and social components	Sajasi et al (2019)
14	legal, economic, moral, social, and environmental components	Mousavi et al (2018)

No.	Extracted codes	Reference
15	attention to charity, moral, legal and economic components	Kashanipour et al (2018)
16	Islamic moral system, principles of Islamic business, profit and loss system, Islamic accounting regulations	Talebnia et al (2018)

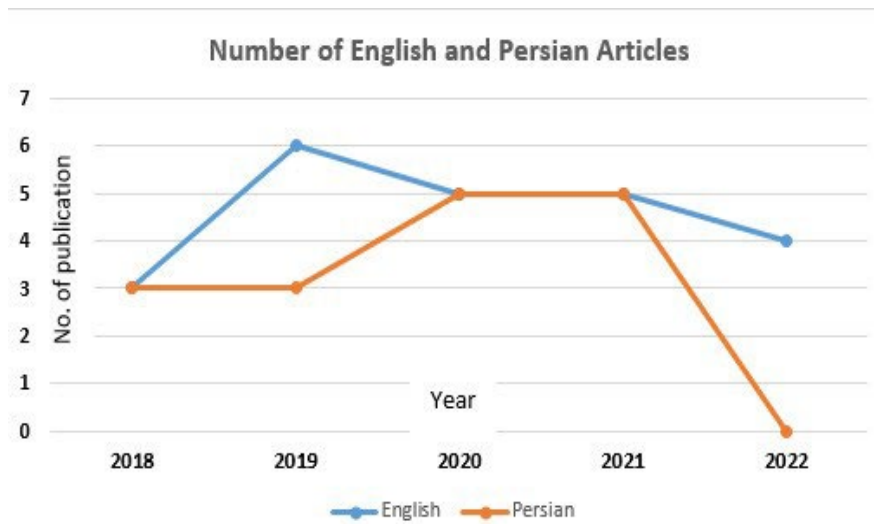


Figure 3: Distribution of the publication per year

4.2 Results of classification

The codes extracted from English-language articles in the field of CSR were carefully examined and 21 general categories of dimensions were identified (Table 3). Moreover, 13 general categories of dimensions were identified from Persian-language articles (Table 4). Figure 4 , 5 show each code's frequency(ies) in the selected English and Persian articles, respectively.

It is noteworthy that, the numbers of the codes on the X-axis in Figures 4 and 5 are the numbers of the presented code in Tables 3 and 4, respectively.

Table 3: Classification of codes extracted from English language articles

No.	Categories
1	environment
2	not using toxic ingredients and pollutants emission reduction
3	energy saving
4	using the renewable energy
5	transparent reporting
6	developing the employees
7	to be innovative
8	philanthropic responsibilities
9	social responsibilities
10	attention to the customers
11	economic responsibilities
12	government requirements
13	legal responsibilities
14	ethical responsibilities
15	voluntary actions
16	external pressures
17	stakeholders
18	contribution to health sector
19	contribution to education sector
20	help managing the natural disaster crisis
21	quality of products and services

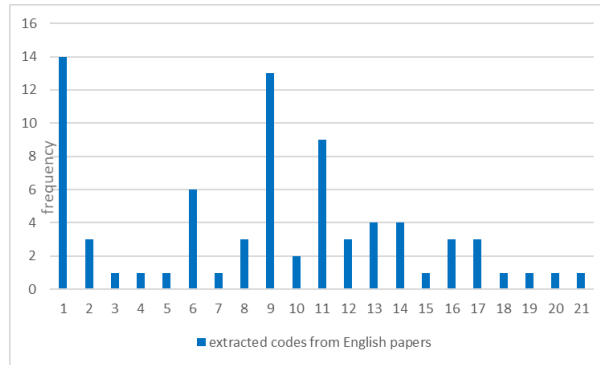


Figure 4: Extracted codes from English-language papers

Table 4: Classification of codes extracted from Persian language articles

No.	Categories
1	environment
2	social, benevolent and public benefit affairs
3	humanitarian affairs and improving the quality of life
4	economic components
5	security, law, and justice
6	orbital ethics and Morality
7	voluntary and Charitable actions
8	animal rights
9	political components
10	cultural components
11	accountability and informing
12	performance results
13	Islamic laws and values



Figure 5: Extracted codes from Persian-language papers

Another finding of the paper is about the most popular codes among extracted ones in English and Persian language articles in Figures 4 and 5. “Environment” and “social responsibility” with 14 and 13 times are the most frequency codes in English articles. It means these two codes can be seen respectively in the 66.67 and 61.90 percentage of the CSR models of English papers. On the other hand, “humanitarian affairs and improving the quality of life” with 11 times is occupied the first position in the CSR models of Persian papers, which is about 84.62 percent of these articles. The second position with 10 times in Persian articles has 4 competitors by name “social, benevolent, and public benefit affairs”, “economic responsibility”, “security, law, and justice”, and “orbital ethics and morality”. These codes have been used in the 76.92 percent of the CSR models of Persian papers.

The identification dimensions of English and Persian articles were compared indicating that 9 classes out of 13 Persian articles overlapped with English articles. These 9 classes included “attention to the environment”, “social, benevolent and public benefit affairs”, “humanitarian affairs and improving the quality of life”, “economic components”, “security, justice, and law”, “voluntary actions”, “orbital ethics and morality”, “accountability and informing”, and “performance results”. Furthermore, we performed a more detailed comparison and examination of the categories and codes extracted from Persian and English articles. It was indicated the

dimensions of “animal rights”, “political components”, “cultural components”, and “Islamic laws and values” were considered only in Persian articles (Figure 6).

We also found 12 categories, which were considered only in the English articles including “not using toxic ingredients and pollutants emission reduction”, “using renewable energy”, “energy saving”, “developing the employees”, “innovativeness”, “the customers”, “government requirements”, “external pressures”, “the stakeholders”, “contribution to the health sector”, “contribution to the education sector” and “help to manage the natural disaster crisis”.

Figure 6 shows the model. In this model, the middle column is about overlapped dimensions on both groups of articles and the left and the right columns are about specific dimensions of Persian and English articles, respectively.

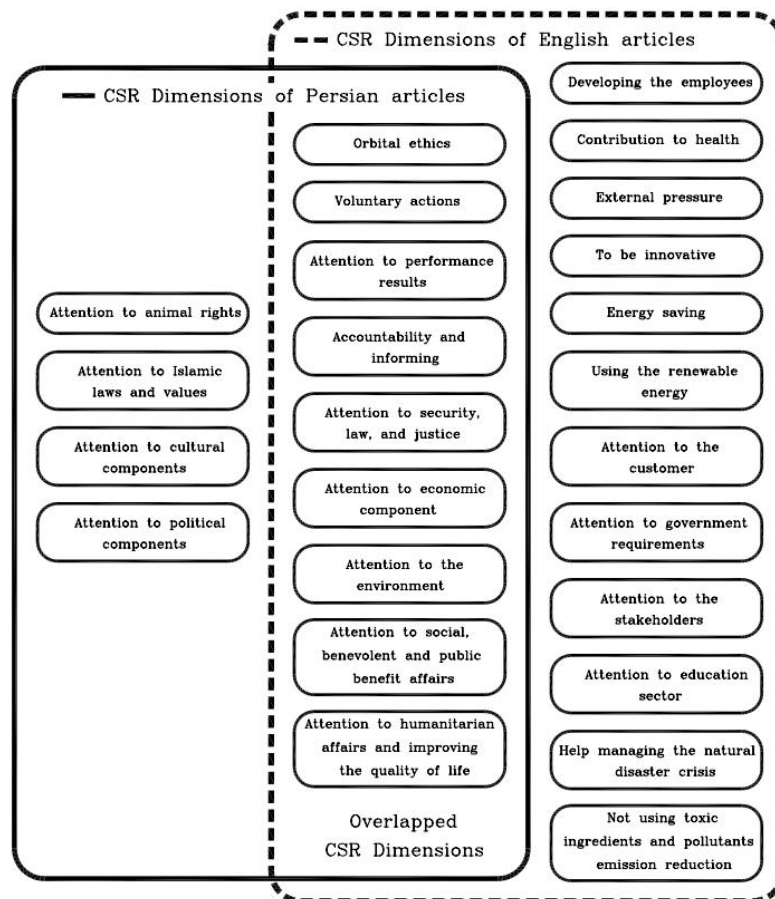


Figure 6: The extracted dimensions of English and Persian language articles

5. Discussion and Conclusions

CSR is dated back hundreds of years ago. However, it was less considered for practical purposes mostly related to today's executives. CSR is highly believed as a Western invention (highly true in its modern conception). However, it was evidenced that in developing countries CSR is strongly based on deep-rooted indigenous cultural traditions of philanthropy, community embeddedness, and business ethics. According to editors Birch and Moon (2004), CSR performance is greatly different between countries in Asia, with various CSR issues being tackled (e.g. education, employee welfare, environment) and modes of action (e.g. volunteering, foundations, and partnerships). On the other hand, Chapple and Moon (2005) in Asia concluded that ‘CSR considerably varies among Asian countries. However, this difference is not clarified by development rather than by factors in the respective national business systems (p. 415). Although, there are some CSR models which are being used in the developed European countries, it needed to find out the CSR models in Iran as a developing Asian country. Based on the conducted systematic literature review on English and Persian CSR models, we concluded that there are several overlapped dimensions. On the other hand, each of the models has some specific dimensions that haven't been used on the other one.

The differences between Persian and English CSR models can be caused by the cultures, laws, religions, and perceptions of CSR, therefore, nobody can force them to follow the other one's dimensions. Although due to universal expectations, Persian models should more focus on some of the neglected codes of English models, such energy saving and using the renewable energy. This can be a fruitful and practical output for Iranian policymakers, businessmen, shareholders, and other Iranian to understand where they are stand in terms of CSR and what should they do to improve themselves via CSR.

References

- Alavi, S., Ghafouri, F. and Honary, H. (2020) "Identifying dimensions of social responsibilities of famous athletes", *Sports Management Studies*, Vol 12, Number 59, 176-153.
- Albareda, L., Lozano, J.M. and Ysa, T. (2007) "Public Policies on Corporate Social Responsibility: The Role of Governments in Europe", *Journal of Business Ethics*, Vol 74, No. 4, pp. 391-407.
- Alidadiani, F. and Soleymannpour_Omran, M. (2019) "The relationship between environmental behavior and the level of systemic thinking and social responsibility", *Environmental Education and Sustainable Development Quarterly*, Year 7, Number 3, 98-102.
- Al Mubarak, Z., Ben Hamed, A. and Al Mubarak, M. (2019), "Impact of corporate social responsibility on bank's corporate image", *Social Responsibility Journal*, Vol 15, No. 5, pp. 710-722.
- Bahta, D., Yun, J., Rashidul_Islam, Md. & Bikanyi, K.J. (2021) "How does CSR enhance the financial performance of SMEs? The mediating role of firm reputation", *Economic Research-Ekonomska Istraživanja*, 34:1, 1428-1451.
- Becheikh, N., Landry, R. and Amara, N. (2006) "Lessons from innovation empirical studies in the manufacturing sector: a systematic review of the literature from 1993–2003", *Technovation*, Vol 26, No. 5, pp. 644-664.
- Boğan, E. and Dedeoğlu, B. (2019) "The influence of corporate social responsibility in hospitality establishments on students' level of commitment and intention to recommend", *Journal of Hospitality, Leisure, Sport & Tourism Education*, Vol 25, 100205.
- Chapple, W., & Moon, J. (2005) "Corporate Social Responsibility (CSR) in Asia: A Seven-Country Study of CSR Web Site Reporting", *Business & Society*, 44 (4), pp. 415- 441.
- Chavoshbashi, F. (2008) "Income on Social Responsibility at the Corporate Level", *Journal of Social Responsibility*, No. 2 (35): 890414.
- Darini, A. (2020) "The role of business ethics in corporate social responsibilities", *Accounting and Management Perspective Quarterly*, Vol 3, Number 36, 61-73.
- Fallah, M.A. and Mojarrad, F. (2019), "Corporate governance effects on corporate social responsibility disclosure: empirical evidence from heavy-pollution industries in Iran", *Social Responsibility Journal*, Vol 15, No. 2, pp. 208-225.
- Famiyeh, S., Asante-Darko, D., Kwarteng, A., Gameti, D.K. and Asah, S.A. (2020), "Corporate social responsibility initiatives and its impact on social license: some empirical perspectives", *Social Responsibility Journal*, Vol 16, No. 3, pp. 431-447.
- Fatourechi, Z., Pouramini, Z. and Salmanzadeh, L. (2020) "Investigating the effect of commitment to social responsibility and green marketing on the environmental performance of companies", *Scientific Quarterly of Sustainable Environment Education*, Year 9, Number 1, 108-95.
- Fink, A. (1998) *Conducting Research Literature Reviews: From Internet to the Paper*, Sage Publications, London.
- Foroughinesab, M., Sarraf, F. And Najafi_Moghadam, A. (2021) "Dimensions of social responsibility and improvement of financial and non-financial performance of companies", *Accounting and Auditing Research*, No. 50, 81-98.
- Gangi, F., Mustilli, M. and Varrone, N. (2019), "The impact of corporate social responsibility (CSR) knowledge on corporate financial performance: evidence from the European banking industry", *Journal of Knowledge Management*, Vol 23, No. 1, pp. 110-134.
- García-Sánchez, I.M., Cuadrado-Ballesteros, B., & Frias-Aceituno, J.V. (2016) "Impact of the Institutional Macro Context on the Voluntary Disclosure of CSR Information", *Long Range Planning*, 49(1), 15-35. doi: <https://doi.org/10.1016/j.lrp.2015.02.004>
- George, N.A., Aboobaker, N. and Edward, M. (2020), "Corporate social responsibility and organizational commitment: effects of CSR attitude, organizational trust and identification", *Society and Business Review*, Vol 15, No. 3, pp. 255-272.
- Ghasemnejad, Kh., Jazini, A., Mohammadi_Moghadam, Y. and Hendiani, A. (2019) "The pattern of social responsibility of organizations in the social prevention of crime", *Quarterly Journal of Police Management Research*, 14th year, number 1, 9-32.
- Ghorbani, M.J. (2020) "An Investigation of Corporate Social Responsibility (CSR) Model of Oil Refining Companies via Exploratory Mix Method", *Organizational Culture Management (18)1*, pp. 1-27.
- Ghorbani, M., Faqhihi, A. and Azizi, Sh. (2020) "Social responsibility model of oil refining companies", *Organizational Culture Management*, Vol 18, Number 1, 1-26.

- Goudarzi, M. and Hoseini_Shokrabi, S.H. (2020) "Design a Model for the Development of Social Responsibility of the Physical Education General Directorate of Payame Noor University". *Applied Research of Sport Management*(9)4, 91-106. *Journal of Management and Development Process* (4)1, pp. 3-28.
- Grover, P., Kumar Kar, A. and Vigneswara, P. (2019) "Impact of corporate social responsibility on reputation—Insights from tweets on sustainable development goals by CEOs", *International Journal of Information Management*, Vol 48, 39-52.
- Gursoy, D., Boğan, E., Dedeoğlu, B. and Çalışkan, C. (2019) "Residents' perceptions of hotels' corporate social responsibility initiatives and its impact on residents' sentiments to community and support or additional tourism development", *Journal of Hospitality and Tourism Management*, Vol 39, 117-128.
- Heidarzadeh_Hanzaee, K. and Rahpeima, A. (2013) "CSR: A Scale Development Study in Iran". *Research Journal of Applied Sciences, Engineering and Technology* 6(9): 1513-1522, 2013.
- Hichri, A. and Ltifi, M. (2021), "Corporate social responsibility and financial performance: bidirectional relationship and mediating effect of customer loyalty: investigation in Sweden", *Corporate Governance*, Vol 21, No. 7, pp. 1495-1518.
- Ho, F.N., Wang, H.M.D. and Vitell, S.J. (2012) "A Global Analysis of Corporate Social Performance: Th Effects of Cultural and Geographic Environments", *Journal of Business Ethics*, 107(4), 423-433. doi: <https://doi.org/10.1007/s10551-011-1047-y>
- Horak, S., Arya, B., and Ismail, K.M. (2018) "Organizational Sustainability Determinants in Different Cultural Settings: A Conceptual Framework", *Business Strategy and the Environment*, 27(4), 528-546. doi: <https://doi.org/10.1002/bse.2018>
- Huang, Q. and Lin, M. (2022) "Do climate risk beliefs shape corporate social responsibility", *Global Finance Journal*, 53, 100739.
- Jeffrey, S., Rosenberg, S. and McCabe, B. (2019), "Corporate social responsibility behaviors and corporate reputation", *Social Responsibility Journal*, Vol 15, No. 3, pp. 395-408.
- Kashanipour, M., Kazempour, M. and Ismailbeigi, F. (2018) "Social responsibility in the banking industry of different countries of the world", *Accounting and Auditing Studies*, No. 27, 9-34.
- Khalifesoltani, M., Gooderzi, M., Dehghan_Qahfarkhi, A. and Alidoust_Qahfarkhi, E. (2021) "Presentation of the social responsibility model of sports celebrities", *Organizational Behavior Management Studies in Sports*, Vol 8, Number 29, 29-48.
- Koprowski, S., Mazzioni, S., Dal Magro, C. B. and Rosa, F. S., (2021) "National Culture and Corporate Social Responsibility", *Revista Brasileira de Gestão de Negócios*, 22(1), p.1-15.
- Labafi, S., Jahdi, P. and Niki_Maleki, h. (2021) "Mapping the Islamic-Iranian constructs of social responsibility using Zaltman's metaphor extraction technique", *Culture in Islamic University*, Year 11, Number 2, 333-354.
- Le, T.T. (2022) "How do corporate social responsibility and green innovation transform corporate green strategy into sustainable firm performance? ", *Journal of Cleaner Production*, 362, 132228.
- Lee, S., Han, H., Radic, A. and Tariq, B. (2020) "Corporate social responsibility as a customer satisfaction and retention strategy in the chain restaurant sector", *Journal of Hospitality and Tourism Management*, Vol 45, 348-358.
- Li, D., Lin, H. and Yang, Y. (2016), "Does the stakeholders—corporate social responsibility relationship exist in emerging countries? Evidence from China", *Social Responsibility Journal*, Vol 12, No. 1, pp. 147-166.
- Maali, K., Rakia, R. and Khairredine, M. (2021), "How corporate social responsibility mediates the relationship between corporate governance and sustainability performance in UK: a multiple mediator analysis", *Society and Business Review*, Vol 16, No. 2, pp. 201-217.
- Maon, F., Swaen, V. and Lindgreen, A. (2015) "One Vision, Different Paths: An Investigation of Corporate Social Responsibility Initiatives in Europe", *Journal Business of Ethics*, pp.1-18.
- Midttun, A., Gautesen, K. and Gjolberg, M. (2006) "The Ploitical Economy of CSR in Western Europe", *Corporate Governance*, Vol 6, No.4, pp. 369-385.
- Minaei, N., Pourkiani, M., Zayandehroody, M. and Sheikhy., A. (2020) "Presenting an Executive Sustainable Development Model Based on the (CSR) and Green Management with Accountability in Executive Organizations", *International Journal of Social Sciences (IJSS)*, Vol 10, No. 2, 2020.
- Mousavi, SA., Shah_Veisi, F. and Rezaei, F. (2018) "Explaining the pattern of corporate social responsibility and its effect on profit quality", *Accounting and Auditing Research*, No. 39, 167-188.
- Park, E. (2019) "Corporate social responsibility as a determinant of corporate reputation in the airline industry", *Journal of Retailing and Consumer Services*, Vol 47, 215-221.
- Petticrew, M. and Roberts, H. (2008), *Systematic Reviews in the Social Sciences: A Practical Guide*, John Wiley & Sons, Victoria.
- Poljašević, B.Z. (2012) "Corporate Social Responsibility and National Competitiveness: Role of Government". *Accelerating the world's research*, pp. 1-18.
- Pustokhin, D.A. and Pustokhina, I.V. (2020) "National Model of Corporate Social Responsibility : Comparative Analysis". *Intellect. Innovations. Investments*, pp. 93-103.
- Raoufimaram, N., Amirnjad, A., Makundi, F. and Chenari, V. (2021) "Designing the optimal model of social responsibilities of the Iranian Ports Organization with a sustainable development approach", *Sociological Research*, year 15, number 2, 37-67.

- Ringov, D., and Zollo, M. (2007) "The Impact of National Culture on Corporate Social Performance. Corporate Governance", *The International Journal of Business in Society*, 7(4), 476-485. doi:https://doi.org/10.1108/14720700710820551
- Rossi, M., Festa, G., Chouaibi, S., Fait, M. and Papa, A. (2021) "The effects of business ethics and corporate social responsibility on intellectual capital voluntary disclosure", *Journal of Intellectual Capital* Vol 22, No. 7, 2021 pp. 1-23.
- Saenz, C. (2021) "The relationship between corporate social responsibility and the social licence to operate: A case study in Peru", *Resources Policy*, 74, 102399.
- Sajasi_Gheydari, H., Shayan, H. and Vaez_Tabasi, A. (2019) "Measuring the social responsibility of agricultural entrepreneurial companies in rural areas", *Rural Research Quarterly*, Vol 10, Number 2, 213-200.
- Sapir, A. (2005): Globalisation and the Reform of European Social Models, Background document for the presentation an ECOFIN Informal Meeting in Manchester, later published in: *Journal of Common Market Studies*, Vol 44, No.2, pp. 369-390.
- Shipton, L. and Dauvergn, P. (2022) "The influence of home country institutions on the adoption of corporate social responsibility policies by transnational mining corporations", *The Extractive Industries and Society*, Available online 25 April 2022, 101077, In Press.
- Sobhani, M., Ataee, M., Memarzadeh_Tehran, Gh. and Alborzi, M. (2020) "Designing a social responsibility model for Iran's government organizations", *Development Management Process*, Vol 33, Number 4, 3-28.
- Su, L. and Swanson, S. (2019) "Perceived corporate social responsibility's impact on the well-being and supportive green behaviors of hotel employees: The mediating role of the employee-corporate relationship", *Tourism Management*, Vol 72, 437-450.
- Talebniya, A., Rajab_Dari, H. and Khani_Zalan, A. (2018) "Investigating factors affecting corporate social responsibility from an Islamic perspective", *Islamic Management Quarterly*, year 26, number 2, 183-211.
- Tranfield, D., Denyer, D. and Smart, P. (2003), "Towards a methodology for developing evidence-informed management knowledge by means of systematic review", *British Journal of Management*, Vol 14, No. 3, pp. 207-222.
- Wang, C., Zhang, Q. and Zhang, W. (2020) "Corporate social responsibility, Green supply chain management and firm performance: The moderating role of big-data analytics capability", *Research in Transportation Business & Management*, Vol 37, 100557.
- Zainee, I.A. and Puteh, F. (2020), "Corporate social responsibility impact on talent retention among Generation Y", *Revista de Gestão*, Vol 27, No. 4, pp. 369-392.
- Zeng, J., Ren, J. and Ning, Z. (2022) "Mediating effect of corporate social responsibility-based entrepreneurship on environmental improvement: Evidence from 475 heavy-polluting enterprises", *Journal of Business Research*, 506-517.

Digging Deeper with Delphi – The Four Step Alberta Approach

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Abstract: Originally the Delphi method was created as a systematic research process for establishing agreement and structured forecasts in groups of experts. The method is based around the idea that the agreed judgement from several experts is more accurate and valuable than the judgement from a single expert. In a traditional Delphi study, the selected experts respond to several rounds of questionnaires with aggregated and shared answers among the expert group. A highlighted strength of the Delphi method is its ability to progress into new forms and implementations. Delphi studies have been used for different purposes such as identifying trends, creating guidelines and to develop theory. The aim of this study is to describe and discuss the Delphi study approach that has been developed by researchers in Alberta, Canada. In an effort to dig deeper into the ongoing transformation of higher education for technology enhanced and lifelong learning, the four steps were further modified in a Swedish Canadian study. In a qualitative Delphi study, the four steps were implemented as 1) A literature study to explore the chosen topic, with the selected publications sent out to the expert panel, 2) A survey with questions to the experts based on the findings in the literature study, 3) Email interviews to dig deeper into the answers from the survey, and finally 4) Focus group interviews based on the results from the previous steps. Findings from the various steps have been presented at conferences and published in research journals. The conclusion is that this modified and extended Delphi process has generated a rich set of data that can be used to develop a theoretical framework. At the same time the presented four step approach is time consuming and requires a research team that can work together during a longer time period.

Keywords: Delphi method, Delphi studies, Structured expert forecasts, Qualitative research, The Four Step Alberta Approach

1. Introduction

Scientific research is based on important principles, but research methods are entities under iterative and incremental development. To explore new and complex phenomena in contemporary research there is a need for methods that can go deeper than the standard methods for data collection. The Delphi method was originally created to facilitate a systematic research process to establish agreements for structured forecasts by groups of experts (Sablitzky; 2022). A fundamental idea with the Delphi method is that the agreed judgement from a group of experts is more precise and of more value than the judgement from a single expert. Originally, the method was originally a way of establishing consensus. However, the aim of a Delphi study is to establish to what extent experts agree on a specific subject (Humphrey-Murto et al., 2017; Romero-Collado, 2021). In the traditional design, the expert panel responds to three rounds of questionnaires where the answers are shared among the members in the panel.

As pointed out by Grime and Wright (2016), one strength with the Delphi method is the ability to develop into new forms and implementations tailored to specific research studies. This illustrative case study aims to describe and discuss a Delphi study approach that originally was developed in Alberta, Canada. The further elaborated implementation described in this paper has been designed in a research collaboration between researchers in Canada and Sweden. Instead of the traditional three rounds of questionnaires in a Delphi study, the Alberta approach involves the four steps of 1) An initial literature study to explore the chosen topic of the study, where the selected publications later were sent out to the Delphi expert panel with a reading assignment, 2) An online survey with questions to the expert panel that was based on the findings in the literature study, 3) Email interviews were conducted to dig deeper into the answers from the survey, and step 4) Two Focus group interviews conducted based on the results of the previous steps. A description of the literature study in the first step can be found in Håkansson Lindqvist et al. (2020), and a preliminary analysis involving all the four steps was presented in Jaldemark et al. (2022). More detailed analyses of the findings have been aggregated in two journal articles that both are submitted, but are still in various degrees of revision.

2. The Delphi Method

As presented by Sablatzky (2022), the Delphi Method is a survey technique that researchers use to gain a consensus of an expert panel in a specific field. Expert recommendations and conclusions from data analyses should be carried out through several rounds of questioning and data collection. The Delphi method was developed during the 1950s and 1960s by the RAND corporation to address national security threats during the Cold War. Since then, the method has evolved. Today, the method is today frequently used in a wide variety of research fields, such as marketing, health science, education, and information science (Sablatzky, 2022). Over the years, the method has been modified and adapted in a myriad of ways to better serve in the different research fields and study aims. Therefore, a simple description of the Delphi method is not easy to formulate in a short summary (Grime & Wright, 2016).

An important initial step is to select a diverse group of qualified experts. The purposive selection of these experts should be unique for the study design and the research aim (Grime & Wright, 2016; Sablatzky, 2022). Some more general guidelines for the creation of an expert panel that were recommended by researchers with Delphi experience are: 1) To use experts with relevant domain knowledge, 2) To create a heterogeneous expert panel and 3) To have a panel with between 5 and 20 experts (Rowe & Wright, 2001). As a data collection method, a Delphi study could use both quantitative and qualitative, or mixed method approaches. These approaches are useful in the study of complex phenomena that could be hard to define (Rowe & Wright, 2001; Lilja et al., 2011). Frequently used data collection methods in Delphi studies are surveys, interviews and focus groups (Egan et al., 1995; Lilja et al., 2011).

Moreover, the Delphi method has been adapted for qualitative research and "used in an array of different contexts, where expert knowledge is needed to inform decision making or to understand a phenomenon in greater depth" (Brady, 2015, p. 2). In the field of education and lifelong learning Delphi studies have been fruitful: "Delphi studies have been useful in educational settings in forming guidelines, standards, and in predicting trends" (Green, 2014, p. 1). In a study by Mirata et al. (2020), a four step Delphi design was used to identify, categorise, and prioritise the challenges of adaptive learning in higher education. In similarity with the four-step design presented in this paper, the Mirata et al. (2020) study also contained a pre-step to build a foundation for the remaining four main steps. Another resemblance with our Alberta approach is how internal validity was strengthened by discussions among the members of the research team (*researcher triangulation*), and the strife for reliability by descriptions of how the single rounds of the Delphi study built on each other (Mirata et al., 2020).

3. The Four Step Alberta Approach

According to Okoli and Pawlowski (2004), the Delphi method of capturing an expert review of issues or phenomena has often been used in conceptual framework development. The development of a conceptual framework has also been the overall purpose of this study, with a first framework draft presented in Jaldemark et al. (2022). Together with a pre-step and a final post-step the Alberta approach could be summarised as in Table 1 below.

Table 1. The various steps in the Alberta Approach

Pre-step	Dec, 2021	Literature review Invitation to experts
Step 1	Dec, 2021	Online survey
Step 2	Jan, 2022	Reading assignment
Step 3	May, 2022	E-mail interview responses
Step 4	June/July, 2022	Focus group interviews
Post-step	Feb, 2022	Validation of focus group summary Preliminary conceptual framework

3.1 Pre-step

This Delphi method expert review was a process that engaged relevant experts to respond to significant questions which were initially developed through a systematic review. A literature review with a focus on the

two constructs of lifelong learning and higher education reform, to answer the question of which key themes of lifelong learning, if any, are emerging in higher education reforms (Håkansson Lindqvist et al., 2020). The topic of the review, and the research question, were defined in discussions among the research team with the purpose to retrieve literature that provides background information that could enrich the Delphi study. None of the selected publications had any alignment to anyone in the expert panel. As each member of the research team is from an institution that offers online and blended higher education for over a decade, up to three participants from the researcher's home faculties were invited to participate in the study. A purposively drawn sample of experts was selected. The sample included faculty and instructional designers with research, learning, teaching, and/or design experience in online and blended higher education and/or lifelong learning. This panel of experts was asked to review selected readings from the literature synthesis.

3.2 Step 1

The Delphi method draws upon both quantitative and qualitative data, via survey, individual interview and a focus group with the invited experts. The first step consisted of an online survey that was completed by seven participants. First, the survey was used to collect background data about demographic information, experts' profile and knowledge about heutagogy and lifelong learning. The survey questions focused on examining the relationship between heutagogical practices and blended and online learning and lifelong learning. Data was analysed in developing a greater understanding of the experience and expertise of participants as well as their current understandings of the concepts and the relationship between the concepts. One way of structuring the survey answers was to divide them into the past, the current, and the future of technology enhanced lifelong learning in higher education. The analysis of the survey answers was later used as a foundation for the formulation of the open-ended questions in the email interviews.

3.3 Step 2

In the second step, following the survey, participants were given selected reading assignments. Based on selected readings from the literature synthesis of five articles, each expert was assigned selected articles to read. Articles were partly distributed randomly, and partly with the idea of getting opinions from experts from another continent than where the article studies were conducted. The common theme for the articles was the transformation of higher education for technology enhanced lifelong learning. This reading assignment provided further background on the relationship between the three concepts being investigated in the study. These articles were identified in the literature review and were chosen as a reading assignment for the panel experts. All panel experts received two or three articles to read, and all of the articles were read by more than one of the experts. The experts were also informed that the reading assignment did not involve a review, but thoughts and reflection related to the themes. The reading assignment was based on the articles presented in Table 2 below.

Table 2. Selected publications that were sent out to the expert panel

#	Article
1	Baptista, A. 2016. Revisiting lifelong learning in light of the Bologna process and beyond. <i>Lifelong learning: Concepts, benefits and challenges</i> , 17-35
2	Boyadjieva, P., & Ilieva-Trichkova, P. 2018. Lifelong learning as an emancipation process: A capability approach. In <i>The Palgrave international handbook on adult and lifelong education and learning</i> (pp. 267-288). Palgrave Macmillan, London.
3	Ishak, M. M., Ali, H., Rahim, F. A., Bakar, M. S. A., Ariffin, T. F. T., and Malaysia, S. K. 2018. Managing Learning and Teaching Orientation of Online Centered Approaches in Higher Learning: "MOOC" and Beyond. In <i>Educational Access and Excellence</i> , 1, 119.
4	Kasworm, Carol. 2020. Adult Workers as Learners in the USA Higher Education Landscape. In <i>Inequality, Innovation and Reform in Higher Education</i> , pp. 221-235. Springer, Cham.
5	Weil, M., and Eugster, B. 2019. Thinking outside the box: De-structuring continuing and higher education. <i>Disciplinary Struggles in Education</i> .

3.4 Step 3

After reading the articles, the Delphi experts engaged in email interviews where they were asked questions based on the analysis of the survey and the selected articles. In a questionnaire they were asked open-ended

questions such as: *How often do online learning, including blended learning, instructional design and teaching practice provide opportunities for student self-determination? And if they do, can they influence online learning and lifelong learning? Based on your experiences, what successes and what challenges have you faced in implementing specific aspects of the heutagogical design. Please describe any organisational and technology support used and 2) evidence of impact, if any, on student outcomes.* First the interview data was thematically analysed as outlined by Braun and Clarke (2006; 2012). The review of the data from the survey and interviews were combined and summarised into a two-page summary document that was shared with the experts who participated in the study. Later the data from the e-mail interviews were analysed according to the Grounded theory idea of 1) Open coding, and 2) Axial coding. Findings have been structured and presented in a journal article that is submitted and under review.

3.5 Step 4

In the fourth step, all Delphi experts were invited to participate in a focus group discussion to discuss the proposed conceptual relationships. Due to the different time zones in Canada, US, Europe and Australia, the expert panel was split into two different groups. Within the context of blended and online learning, the following two questions guided this inquiry: (1) *Heutagogy and lifelong learning are similar yet are different, unpack the nature of the relationships; and (2) Review the list of Blasckhey's (2012) heutagogical principles of learner agency, non-linear learning and design, capability/self-efficacy, and reflection/metacognition. What are the things in the design of heutagogical practice that have the greatest impact in relation to technology enhanced lifelong learning?* Both focus group discussions were held online in the Zoom video conferencing system where the discussions were recorded as MP4-files. The files were then transcribed and from the long transcripts of the focus groups, a two-page summary was developed and shared with the experts for validation. Preliminary findings from a first analysis were presented at a conference (Jaldemark et al, 2022). A deeper analysis, together with the results from the findings in the analyses of Step 3 is work in progress.

4. Discussion

The aim of this paper was to describe and discuss a Delphi study approach that originally was developed in Alberta, Canada. The four step Alberta approach in this Delphi study involved a pre-step and a final post-step. The panel experts were involved in the four steps of a survey, a reading assignment of selected reading, an email interview, and focus group interviews. The question of issue is what specific contribution the Four Step Alberta Approach provides, compared to other Delphi studies, and why the pre- and post-steps add value. To involve a pre-step where the expert invitation was combined with a literature review appears to comprise a valuable extension. The authors, of course, had some previous experience and knowledge about lifelong learning in higher education, but the review resulted in deeper knowledge about reform initiatives and recent related research. The findings from the literature review were of help, in all the following steps, and in the formulation of questions for the survey and the interviews. Moreover, asking the expert panel to review the publications that were selected from the literature review increased the focus on different aspects of the transformation of higher education for lifelong learning in the current digital era (Baptista, 2016; Boyadjieva & Ilieva-Trichkova, 2018; Ishak et al., 2018; Kasworm, 2020; Weil & Eugster, 2019).

The survey in Step 1 could be perhaps considered to be the most traditional part of this Delphi study. Here, there are interesting results that were divided both on a timeline and on granularity level which contributed to the micro-level, meso-level and macro-level. Furthermore, the survey answers gave important information regarding what was categorised as 'Dominant views' and 'Emerging issues'. Some examples of dominant views from the answers are neoliberalism, corporate and utility values, academic activism, societal engagement, ecological growth, decolonisation and digital transition. Emergent issues brought up in the answers were part-time students living off campus, the increasing use of digital technologies, climate crisis sustainability, and access to education for all. Before the reading assignment was sent out in the second step, the authors discussed how much reading that could be sent out to the experts. Almost all of them work full-time at different universities and with ambitious ongoing research as well. The decision was to cut down from three to two publications, and with a distribution of the texts so that there always was more than one person who read every article. The articles were mainly selected for the reason that they contributed to describe the complex study phenomenon, but also to provide input from different parts of the world, as well as different aspects of lifelong learning. As highlighted by Billet (2010), it sometimes makes sense to make a distinction between lifelong learning and lifelong education. This is in line with the perspective of lifelong learning as an individual capacity building and a personal emancipation process, which was mainly represented in Boyadjieva and Ilieva-Trichkova (2018).

The email interviews that were sent out resulted in answers beyond expectation for a structured interview. Most of the questions were based on the articles in the reading assignment. These questions resulted in many interesting comments and relevant recommendations from the experts. After an initial preliminary thematic analysis, the interview answers were reanalysed more thoroughly as part of the third step. With the Grounded theory idea of Open coding, two different analyses were carried out, before the two analysing authors discussed the two different analyses to compare the similarities, dissimilarities and relations in the findings. Following this, the two different Open Coding analyses were sent to a third investigator in the Delphi study research team for a further analysis involving comparison and merging of found codes and subcodes. The final step of the Open coding involved further discussions among the authors where codes and subcodes were grouped into preliminary categories. According to the Grounded theory concept of Axial coding the categories from the Open coding process were revised and organised around a central category (the phenomenon), with relations and dependencies to the other categories (Vollstedt and Rezat, 2019). As an answer to the posited research question: What are the critical aspects of higher education transformation for lifelong learning in a digital era?, the categories of 'Infrastructure', 'Multimodal delivery', 'Pedagogical change', 'Financial aspects', 'Quality and organisation', 'Digital literacy', 'Accessibility', and 'Equity, diversity and inclusion (EDI)', were aligned around the central category 'Higher education transformation for lifelong learning'.

In the fourth step, the focus group interviews were divided into two groups to cope with the different time zones in America, Europe, Asia and Australia. Following the main idea of focus groups with researchers as moderators more than interviewers, the panel experts led the discussions. Both focus groups sessions were recorded, with audio and video for the data analysis. In the post-step after the data analysis, a validation was conducted where a summary of the interview transcripts was sent to the experts. The validated results from step 4 were used as a foundation for the preliminary framework presented in Jaldemark et al. (2022). In the future, this framework could be applied by higher education institutions in lifelong learning initiatives. However, in order to refine the framework, a confirmatory coding is currently being conducted. As outlined for quality data analysis, the open coding and the axial coding processes should be followed up and refined with confirmatory coding (Neuman, 2006). The updated framework and the results from the confirmatory coding will be presented as a journal article that will be submitted during the second half of 2023. Finally, the four-step approach described here has been used for the first time in a study that was conducted during the pandemic. Parts of the described steps can be further developed, and as an example the structured email interviews could be conducted as semi-structured interviews face-to face. In this study the focus groups were divided by time zones for a study that involved experts from four continents. A Delphi study with a smaller geographical spread could get a richer discussion with all experts in a larger focus group.

5. Conclusion

Every research study should have its tailored methods, and the adaptation and refinement of traditional methods is a continuous process that researchers have to struggle with. The described implementation of the Delphi method worked well for the actual study where it was used. On the other hand, to carry out a Delphi study this way is time consuming, and probably too slow for more traditional Delphi studies aiming at a relatively rapid consensus on an urgent topic. The authors' intention is to develop the method further. However, exactly how this will be done, must be aligned to the chosen topic and study purpose where it should be applied.

References

- Baptista, A. 2016. Revisiting lifelong learning in light of the Bologna process and beyond. *Lifelong learning: Concepts, benefits and challenges*, 17-35. Nova Publishers, New York.
- Billett, S., 2010. The perils of confusing lifelong learning with lifelong education. *International journal of lifelong education*, 29(4), pp.401-413.
- Blaschke, L.M., 2012. Heutagogy and lifelong learning: A review of heutagogical practice and self-determined learning. *The International Review of Research in Open and Distributed Learning*, 13(1), pp.56-71.
- Boyadjieva, P., and Ilieva-Trichkova, P. 2018. Lifelong learning as an emancipation process: A capability approach. In *The Palgrave international handbook on adult and lifelong education and learning* (pp. 267-288). Palgrave Macmillan, London.
- Brady, S.R., 2015. Utilizing and adapting the Delphi method for use in qualitative research. *International Journal of Qualitative Methods*, 14(5), p.1609406915621381.
- Braun, V., and Clarke, V. 2006. Using thematic analysis in psychology. *Qualitative research in psychology*, 3(2), 77-101.

- Braun, V., and Clarke, V. 2012. Thematic analysis. In H. Cooper, P. M. Camic, D. L. Long, A. T. Panter, D. Rindskopf, & K. J. Sher (Eds.), *APA handbook of research methods in psychology*, Vol. 2. Research designs: Quantitative, qualitative, neuropsychological, and biological(pp. 57–71). American Psychological Association.
- Egan, A. F., Jones, S. B., Luloff, A. E., and Finley, J. C. 1995. The value of using multiple methods: An illustration using survey, focus group, and Delphi techniques. *Society & Natural Resources*, 8(5), 457-465.
- Green, R.A., 2014. The Delphi technique in educational research. *Sage Open*, 4(2), p.2158244014529773.
- Grime, M. M., and Wright, G. 2016. Delphi method. *Wiley StatsRef: Statistics Reference Online*, 1, 16.
- Humphrey-Murto, S., Varpio, L., Gonsalves, C. and Wood, T.J., 2017. Using consensus group methods such as Delphi and Nominal Group in medical education research. *Medical teacher*, 39(1), pp.14-19.
- Håkansson Lindqvist, M.H., Mozelius, P., Jaldemark, J. and Cleveland-Innes, M., 2020. A Literature Review of Higher Education Reform and Lifelong Learning in a Digital Era. In *EDEN Conference Proceedings* (No. 1, pp. 189-197).
- Ishak, M. M., Ali, H., Rahim, F. A., Bakar, M. S. A., Ariffin, T. F. T., and Malaysia, S. K. 2018. Managing Learning and Teaching Orientation of Online Centered Approaches in Higher Learning: “MOOC” and Beyond. In *Educational Access and Excellence*, 1, 119.
- Jaldemark, J., Cleveland-Innes, M., Håkansson Lindqvist, M.H. and Mozelius, P., 2022. Lifelong learning and the transformation of higher education: A preliminary framework built on networked learning experts’ perceptions. In *13th International Conference on Networked Learning 2022, Sundsvall, 16-18 may 2022* (pp. 1-4).
- Jolson, M. A., and Rossow, G. L. 1971. The Delphi process in marketing decision making. *Journal of Marketing Research*, 8(4), 443-448.
- Kasworm, C., 2020. Adult Workers as Learners in the USA Higher Education Landscape. *Inequality, Innovation and Reform in Higher Education: Challenges of Migration and Ageing Populations*, pp.221-235.
- Lilja, K. K., Laakso, K., and Palomäki, J. 2011. Using the Delphi method. In *2011 Proceedings of PICMET'11: Technology Management in the Energy Smart World (PICMET)* (pp. 1-10). IEEE.
- Mirata, V., Hirt, F., Bergamin, P., and van der Westhuizen, C. 2020. Challenges and contexts in establishing adaptive learning in higher education: findings from a Delphi study. *International Journal of Educational Technology in Higher Education*, 17, 1-25.
- Neuman, W. L., 2006. *Social research methods: Qualitative and quantitative approaches* (6th ed.). New York, NY: Pearson Publishing.
- Okoli, C. and Pawlowski, S.D., 2004. The Delphi method as a research tool: an example, design considerations and applications. *Information & management*, 42(1), pp.15-29.
- Romero-Collado, A., 2021. Essential elements to elaborate a study with the (e) Delphi method. *Enfermería intensiva*, 32, pp.100-4.
- Rowe, G., and Wright, G. 2001. Expert opinions in forecasting: the role of the Delphi technique. *Principles of forecasting: A handbook for researchers and practitioners*, 125-144.
- Sablatzky, T. 2022. The Delphi Method. *Hypothesis: Research Journal for Health Information Professionals*, 34(1).
- Vollstedt, M. and Rezat, S., 2019. An introduction to grounded theory with a special focus on axial coding and the coding paradigm. *Compendium for early career researchers in mathematics education*, 13(1), pp.81-100.
- Weil, M. and Eugster, B., 2019. Thinking outside the box: De-structuring continuing and higher education. *Disciplinary Struggles in Education*.

Structured literature reviews for Business Professional Doctorates: A case study

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Abstract: The first significant piece of writing a Professional Doctorate must undertake is reviewing the literature within their elected field, allowing them to synthesise relevant theories and concepts underpinning their research (Pickering & Byrne, 2014). The task involves searching, assessing, screening and synthesis a significant literature volume. Often this task is perceived as daunting, potentially leading to periods of demotivation, where students feel stuck, particularly in Professional Doctorates (Wisker, 2015).

A basic principle of Professional Doctorates is that candidates contend with the tensions of professional practice and academic scholarship, making sense of the intricacies of crossing intellectual boundaries (Wasserman & Kram, 2009). However, many professional doctorate students have been absent from higher education learning for a long period of time (Allen et al., 2002), to which the literature review process is crucial for doctoral students as it is their opportunity to cross 'conceptual thresholds', which is crucial for gaining new insights into a topic (Wisker, 2015). For professional doctorate students, this process is interconnected with their deep understanding of their professional practice, which drives knowledge production (Costley, 2013).

This paper discusses the characteristics of using structured literature reviews as a pedagogical strategy in a credit-bearing taught module for professional business doctorates. It aims to assess the value of structured literature reviews to improve learning outcomes, doctoral completions and publishing opportunities. The analysis is drawn on a critical case study of the Literature Review module within the Doctorate in Business Administration (DBA) programme at Liverpool John Moore's University. The DBA is used as a critical case study for this research, as it represents the most mature and developed professional doctorate in the University. It reviews the module's internal structure addressing the coherent contents-aims/content-learning outcomes connection and learning techniques (Leger & Sirichand, 2015), the value of research-informed teaching (Joseph-Richard, Almpanis, Wu, & Jamil, 2021), and an exploratory review of students' satisfaction levels (Pickering & Byrne, 2014).

Keywords: Structured Literature Review, Research-Informed Teaching, Professional Doctorate Students

1. Introduction

The Professional Doctorate is distinct in higher education, focusing on complex work-based problems and practical knowledge informed by theory. Part-time study while working in senior positions presents unique challenges. Professional Doctorate students must reconcile detached contexts and engage rigorously with research foundations, relevant theories, theorists, and knowledge contributions. Continuous development of business practice and academic knowledge is crucial (Tranfield & Starkey, 1998).

Even during the research proposal phase, the first significant piece of writing a professional doctorate must undertake is reviewing the literature within their elected field, allowing them to synthesise relevant theories and concepts underpinning their research (Pickering & Byrne, 2014). The literature review is an opportunity to 'join the conversation' established in a particular discipline (Chatterjee-Padmanabhan, Nielsen, & Sanders, 2019). The task involves searching, assessing, screening and synthesis a significant literature volume.

The problem, however, is that professional doctorates are often criticised due to the lack of research-orientated skills and it is common that students have been absent from higher education learning for a long period of time (Allen et al., 2002). This makes the ability to effectively write a literature review a critical incident in the professional doctorate journey.

This paper aims to assess the value of taught structured literature review on a professional doctorate programme, by assessing the module's internal structure regarding the coherent contents-aims/content-learning outcomes connection, learning techniques (Leger & Sirichand, 2015), the value of research-informed teaching (Joseph-Richard et al., 2021), and on an exploratory review of students' satisfaction levels (Pickering & Byrne, 2014).

2. Theoretical background

Professional doctorate students often struggle to immediately refresh and grasp research concepts and applied research learning, due to their relative absence from higher education, and coupled with the high demands of the day-to-day business that they experience in the commercial world (Tucker et al., 2021). This is particularly true regarding their ability to get into a regular habit of reviewing academic literature. Lee and Aitchison (2009, p. 87) argue that writing remains “neglected as a central component of doctoral education”. Writing retreats or the responsibility of the supervision team often conceptualise teaching literature reviews at the doctoral level (Everett, 2022). This perception can be daunting for students, leading to periods of demotivation and feeling stuck, particularly in Professional Doctorates (Wisker, 2015). Developing a sense of competence and offering learning opportunities can help students become more autonomous, which is crucial for all doctoral students, especially for Professional Doctorates, who spend significant time away from the university (McCarthy, 2016).

Professional Doctorates are characterised by the tensions between professional practice and academic scholarship, requiring candidates to navigate the complexities of crossing intellectual boundaries (Wasserman & Kram, 2009). The literature review process is crucial for doctoral students to cross “conceptual thresholds” and gain new insights into their research topic (Wisker, 2015). For Professional Doctorate students, this process is closely interconnected with their deep understanding of their professional practice, driving knowledge production (Costley, 2013). Moreover, Yang (2022) provides a range of international examples where, to fulfill the demands of the knowledge economy, doctoral programmes with a partnership between universities and industry have been promoted by governments. Hence, where professional doctorate students are situated within the “triple helix” of university-industry-government collaborations, adding to the complexity of engaging with academic literature (Thune, 2010). With the multidisciplinary nature of many Professional Doctorate programs, managing the process of collecting, obtaining, and sorting literature can be particularly challenging.

While specific sessions focusing on writing skills have been recognised as important for developing literature writing skills (Chatterjee-Padmanabhan et al., 2019), understanding how to engage with and approach literature reviews as a process should also be considered. Research on literature reviews at the doctoral level often emphasises specific writing approaches, but there appears to be anxiety around collecting, obtaining, and sorting literature. This anxiety may be heightened for Professional Doctorate students, many of whom have been out of higher education for a substantial period. Considering this, we propose that students should have the opportunity to master the literature review process, specifically through structured approaches, to enhance their ability to engage with their disciplinary areas effectively.

3. Methods

A single-holistic case study strategy (Yin, 2017) was utilised, in order to gain an in-depth understanding of the experiences of students studying a DBA program at Liverpool John Moores University, including the introduction of a structured literature review module. It is argued that the DBA is a unique/pioneering case (Yin, 2017), as it represents the most mature and developed professional doctorate in the University. The case had about 50 enrolled doctoral students who participated in 4 week-long workshops in the first 3 years of study that guided them through.

The Structured Literature Review module aims to i) develop advanced knowledge and understanding; ii) enhance critical analysis and synthesis skills; iii) foster research proficiency; and iv) promote scholarly writing and communication. Other research-informed teaching strategies are used, such as active learning sets (Michaelsen, Knight, & Fink, 2002) et al., 2002), online peer learning and collaboration (Wilson, Arshad, Sapouna, McGillivray, & Zihms, 2022); integration of technology (Jones, 2016); and finally, formative assessment and feedforward provide by module teams and supervisors (Leger & Sirichand, 2015).

A multi-method qualitative approach was taken (Creswell and Tashakkori, 2007) consisting of two phases: creative visual methods and a qualitative survey were employed to gather data on students' challenges, processes, and satisfaction (Braun, Clarke, Boulton, Davey, & McEvoy, 2021; Terry, Hayfield, Clarke, & Braun, 2017). The survey was constituted of open-ended questions, and one closed question using a Likert scale ranging from 1 (not useful) to 5 (very useful). The qualitative survey approach allowed for diverse perspectives and ensured participant anonymity. Thematic analysis in N'Vivo 12 revealed key themes from the data (Terry et al., 2017). The study adhered to ethical guidelines and obtained approval from Liverpool John Moores University's Ethics Committee (23/LBR/013). This comprehensive approach provided valuable insights into DBA students' literature review journey (Tranfield & Starkey, 1998).

4. Findings

4.1 Students learning processes – challenges, achievements and satisfaction levels

Data collected through creative visual methods prior to implementing the *Structured Literature Review* module revealed doctoral students' challenges (represented by the triangle symbol), achievements (represented by the plus symbol), and satisfaction (represented by the heart symbol) in the Doctor of Business Administration programme (Figure 1). Qualitative survey data corroborated these findings, highlighting challenges such as information management, distractions from irrelevant information, word length and topic coverage concerns, lack of confidence in writing a quality review, literature and author selection, structuring, and starting points. To address these challenges and provide better support, a systematic approach to literature reviewing was introduced through the Structured Literature Review module.

Students from years 1, 2 and 3 of the Doctor of Business Administration programme provided their feedback regarding challenges, achievements and satisfaction levels with the literature review stages and the contribution of the Structured Literature Review module (Figure 2).

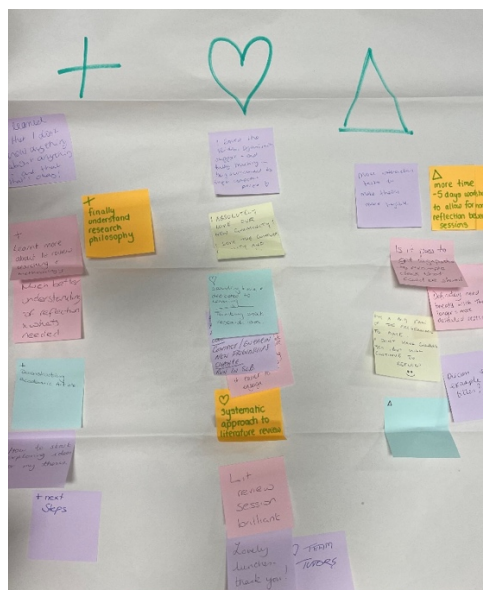


Figure 1: Diagnostic data on doctoral students' challenges, achievements and satisfaction levels. Source: Primary creative data collected by the authors in the classroom

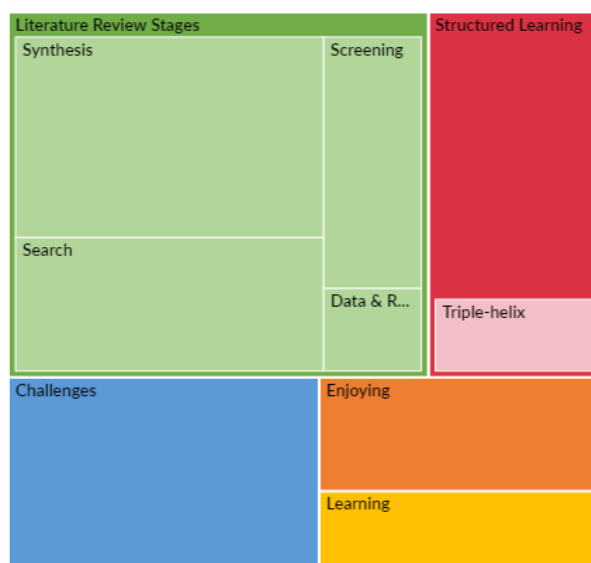


Figure 2: Qualitative survey open-ended question thematic analysis by code density. Source: Qualitative Survey "Literature review - Doctorate in Business Administration."

The students reflected a range of emotions and attitudes towards conducting literature reviews, ranging from negative to positive. Some students perceived it as daunting due to the longer word count and anxiety-provoking due to the fear of missing important elements and excessive editing. Other students expressed feeling comfortable, and interested but needing more structure, confident in their ability to complete a literature review but uncertain about its quality. Others perceived it as a standard and helpful process, feeling confident and enjoying it but acknowledging the need for improved structure.

Respondents highlighted the benefits of breaking down areas of interest into parts, which helps provide a clear outline. A well-executed literature review was considered essential, as it provides a rationale for the problem's existence and presents credible sources in an accessible format. Considering different perspectives and breaking down complex problems into various constructs were identified as valuable outcomes of structured literature reviews. Organising the literature into themes was also helpful for highlighting different areas and facilitating understanding.

4.2 The value of research-informed teaching

Students participating in the *Structured Literature Review* module were asked to assess the usefulness of a series of research-informed teaching strategies (e.g., practice case studies). Participants found practical activities, case studies, theoretical approaches, shared resources, group discussions, and individual reflection useful, with ratings ranging from 4 to 5. It indicates their positive perception and engagement, suggesting the effectiveness of this research-informed teaching in facilitating learning and understanding of structured literature reviews (Figure 3).

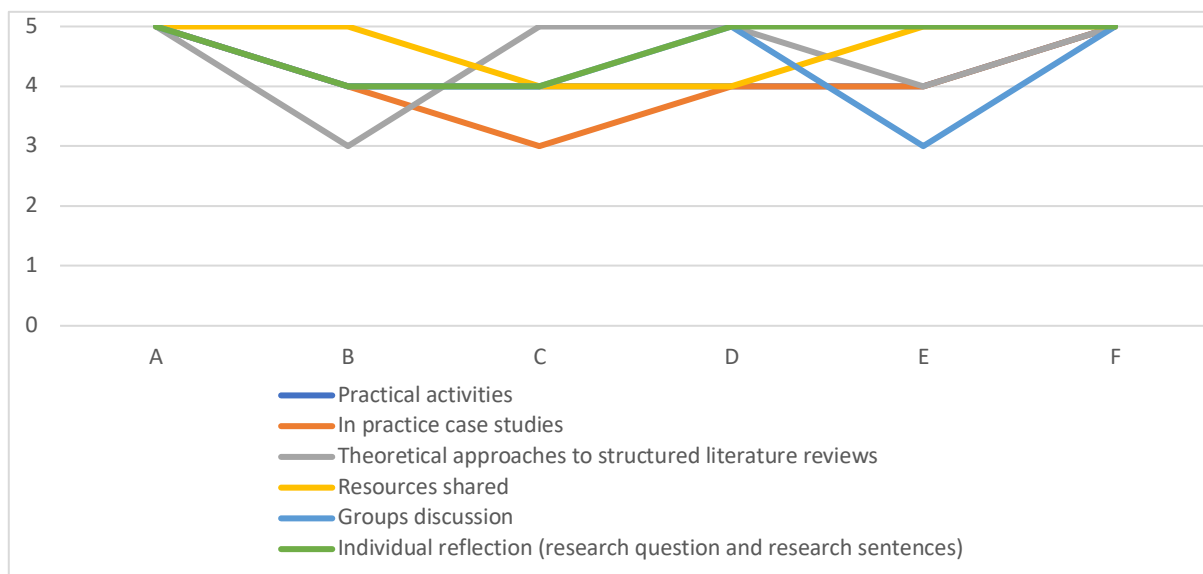


Figure 3: Doctoral Students' satisfaction level with research-informed teaching practice for Literature Review (n=6). Source: Qualitative Survey "Literature review - Doctorate in Business Administration."

The main learning outcomes highlighted were the ability to write critically, establish a clear research thread, and ensure relevance to their study. Participants value learning about developing effective search strategies, screening literature, conducting a comparative analysis, and considering source credibility. Practical tips such as breaking down key areas, utilising Excel for screening, and employing software like EndNote for referencing received positive feedback for efficient reference and data management. Students expressed a strong interest in attending additional sessions to enhance their learning opportunities.

Finally, respondents expressed the need for further support using bibliographic software or tools to effectively organise and analyse collected literature sources. Peer review and one-to-one coaching sessions throughout the writing process were seen as valuable support. Participants also emphasised the importance of avoiding isolation and engaging in topic-specific discussions to generate new ideas. Workshops on efficient searching and examining example literature reviews were mentioned as beneficial.

5. Discussion

This critical case study of a literature review credit-bearing taught module for professional business doctorates addressed the module's internal structure and learning techniques (Leger & Sirichand, 2015), reviewed the students' learning processes regarding challenges, achievements and satisfaction levels (Pickering & Byrne, 2014), and, finally, assessed the value of research-informed teaching (Joseph-Richard et al., 2021).

The findings highlighted students' diverse range of emotions and perceptions towards conducting literature reviews, encompassing both positive and challenging aspects. Once again, this reiterates the need to implement structured literature reviews as a pedagogical strategy to overcome challenging emotions and attitudes (Rowley & Slack, 2004; Wisker, 2015). The qualitative data suggest that structured approaches to literature reviews offer valuable support in understanding complex work-based problems and contribute to supporting professional doctorate students to navigate between university–industry–government ("triple helix") and disciplinary boundaries (Thune, 2010). Research-informed teaching practices facilitate learning and understanding structured literature reviews (Zhu & Pan, 2017). It enhances the quality and effectiveness of teaching by ensuring that instructional strategies, content, and assessments are based on robust empirical evidence. Research-informed teaching promotes student engagement, critical thinking, and deep learning, as it aligns with best practices and pedagogical advancements. This approach also fosters a culture of continuous improvement and innovation in education. References to current research provide credibility, enhance the relevance of course materials, and equip students with up-to-date knowledge and skills (Chatterjee-Padmanabhan et al., 2019). It ultimately enhances the overall learning experience and prepares students for real-world challenges.

Given the longevity and depth required from a doctoral study, structured literature reviews, as a pedagogical strategy in doctoral business education, offer a systematic and rigorous approach to searching, screening, and synthesising literature in a specific field of business administration, following a predetermined methodology (Rowley & Slack, 2004). By following a systematic search and scoping review principles, doctoral students are taught to document what is already known about a topic and then focus on identifying gaps, niches, and disputes to create an agenda for future research (Webster & Watson, 2002). Through structured literature reviews, students learn to identify, analyse, and synthesise existing research to address specific research questions, challenges, or gaps in the field. Additionally, they learn to delineate critical concepts, questions, and theories to refine their research questions and justify their chosen approach. This comprehensive approach enhances their ability to conduct evidence-based research (Leger & Sirichand, 2015). It provides the necessary methodological support for successfully completing the literature review stage of their dissertation, thus avoiding potential periods of demotivation and dropout (Wisker, 2015).

6. Conclusion

This critical case study supports structured literature reviews in Professional Doctorate Business Administration programs. The findings emphasise the benefits of structured approaches in addressing students' challenges, enhancing their learning experiences, and promoting research proficiency. The study highlights the importance of developing students' competence in the literature review process and providing structured learning opportunities. The findings contribute to the existing knowledge and can guide the development of more effective teaching strategies. Recommendations include support with bibliographic software, peer review, coaching, and workshops for efficient searching and synthesis. These suggestions will be considered in future iterations of the Structured Literature Review module.

References

- Allen, C.M., Smyth, E.M., Wahlstrom, M. (2002) Responding to the Field and to the Academy: Ontario's evolving PhD, *Higher Education Research & Development*, 21 (2) 203
- Braun, V., Clarke, V., Boulton, E., Davey, L., & McEvoy, C. (2021). The online survey as a qualitative research tool. *International journal of social research methodology*, 24(6), 641-654.
- Chatterjee-Padmanabhan, M., Nielsen, W., & Sanders, S. (2019). Joining the research conversation: threshold concepts embedded in the literature review. *Higher Education Research & Development*, 38(3), 494-507.
- Costley, C. (2013). Evaluation of the current status and knowledge contributions of professional doctorates. *Quality in Higher Education*, 19(1), 7-27.
- Creswell, J.W. and Tashakkori, A., (2007) Differing perspectives on mixed methods research. *Journal of mixed methods research*, 1(4), pp.303-308.
- Everett, M. C. (2022). Cultivating Academic Help-Seeking Behavior Among First-Semester Nursing Students. *Journal of Nursing Education*, 61(7), 403-407.

- Jones, A. (2016). Digital technology and the contemporary university: Degrees of digitization. In: Taylor & Francis.
- Joseph-Richard, P., Almpanis, T., Wu, Q., & Jamil, M. G. (2021). Does research-informed teaching transform academic practice? Revealing a RIT mindset through impact analysis. *British Educational Research Journal*, 47(1), 226-245. doi:<https://doi.org/10.1002/berj.3681>
- Lee, A., & Aitchison, C. (2009). Writing for the doctorate and beyond. In *Changing practices of doctoral education* (pp. 99-111): Routledge.
- Leger, L. A., & Sirichand, K. (2015). Training in literature review and associated skills. *Journal of Applied Research in Higher Education*, 7(2), 258-274. doi:10.1108/JARHE-01-2014-0008
- McCarthy, G. (2016). Applying self-determination theory to improve completion rates in a part-time professional doctorate program. In *Emerging Directions in Doctoral Education*: Emerald Group Publishing Limited.
- Michaelsen, L. K., Knight, A. B., & Fink, L. D. (2002). *Team-based learning: A transformative use of small groups*: Greenwood publishing group.
- Pickering, C., & Byrne, J. (2014). The benefits of publishing systematic quantitative literature reviews for PhD candidates and other early-career researchers. *Higher Education Research & Development*, 33(3), 534-548. doi:10.1080/07294360.2013.841651
- Rowley, J., & Slack, F. (2004). Conducting a literature review. *Management research news*, 27(6), 31-39.
- Terry, G., Hayfield, N., Clarke, V., & Braun, V. (2017). Thematic analysis. *The SAGE handbook of qualitative research in psychology*, 2, 17-37.
- Thune, T. (2010). The Training of “Triple Helix Workers”? Doctoral Students in University–Industry–Government Collaborations. *Minerva*, 48(4), 463-483. doi:10.1007/s11024-010-9158-7
- Tranfield, D., & Starkey, K. (1998). The nature, social organization and promotion of management research: Towards policy. *British journal of Management*, 9(4), 341-353.
- Tucker, M., Wilson, H., Hannibal, C., Lawless, A., Qu, Z. (2021) Delivering professional doctorate education: challenges and experiences during the COVID-19 pandemic, *SHS Web of Conferences*, 99, DOI: 10.1051/shsconf/20219901012
- Wasserman, I. C., & Kram, K. E. (2009). Enacting the scholar—Practitioner role: An exploration of narratives. *The Journal of Applied Behavioral Science*, 45(1), 12-38.
- Webster, J., & Watson, R. T. (2002). Analyzing the past to prepare for the future: Writing a literature review. *MIS quarterly*, xiii-xxiii.
- Wilson, C., Arshad, R., Sapouna, M., McGillivray, D., & Zihms, S. (2022). ‘PGR Connections’: Using an online peer-learning pedagogy to support doctoral researchers. *Innovations in Education and Teaching International*, 1-11.
- Wisker, G. (2015). Developing doctoral authors: Engaging with theoretical perspectives through the literature review. *Innovations in Education and Teaching International*, 52(1), 64-74.
- Zhu, L., & Pan, W. (2017). Application of research-informed teaching in the taught-postgraduate education of maritime law. *Innovations in Education and Teaching International*, 54(5), 428-437. doi:10.1080/14703297.2015.1102080
- Yang H. (2022) A Triple Helix Model of Doctoral Education: A Case Study of an Industrial Doctorate. *Sustainability*. 14(17):10942. <https://doi.org/10.3390/su141710942>

Combining Phenomenology and Grounded Theory in Software Engineering: An Experience

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Abstract: Phenomenology and grounded theory are two prominent qualitative methods, particularly used in social sciences research. Phenomenology is carried out to understand the individuals' actual experience regarding a phenomenon. The method describes "what" individuals experience and "how" they experience it. The focus is on the meaning of the exposures experienced by individuals regarding the phenomenon. Grounded theory on the other hand allows researchers to explore a phenomenon in depth with individuals, by which a theory is then generated. The goal is to go beyond the understanding of phenomenon by producing a theory that describes comprehensively the problem being studied. Although these two methods are initiated by similar motivations, namely to understand a phenomenon, they however employ slightly different approaches during execution. The differences make them fit complementary together to produce a more concrete and holistic outcome. To research that occasionally use qualitative methods such as Software Engineering, these methods bring new and multifaceted experience. Software Engineering research opts for qualitative methods to promote understanding, as many phenomena in the field have yet to be understood by its community. In that respect, grounded theory is becoming quite a norm in Software Engineering research in recent years, phenomenology however is relatively sporadic. This paper shares the experience of employing as well as combining phenomenology and grounded theory in Software Engineering research. The sharing is intended to inspire future research in twofold: more technical fields such as Software Engineering to employ qualitative methods in research; and leveraging the benefits of combining two qualitative methods complementarily in one study.

Keyword: Software engineering, grounded theory, phenomenology

1. Introduction

Qualitative research includes any study that produces findings that are not derived by means of quantification (Corbin & Strauss, 2015). It seeks understanding of a phenomenon in a context-specific setting with the aim to develop knowledge from the experience gained through humans' lives and social worlds. It comprehends and characterises human behaviours as the people encounter, engage and live through specific situations (Elliot et al., 1999; Patton, 1990). In contrast to quantitative, qualitative research gathers data from the participants' perspective in their natural settings besides being dynamic in nature with less restricted protocols for data collection and analysis. The qualitative research is beneficial in multifaceted situations where human behaviours, emotions, beliefs and values cannot be sufficiently described through quantitative methods (Seaman, 1999; Langley, 1999), as well as when there is a need to develop knowledge in poorly understood research areas (Stebbins, 2001; Fossey et al., 2002; Brown, 2006).

Software Engineering (SE) is the discipline that concerns developing and managing large-scale software systems. It bridges two distinct but related worlds, that is, the hard and soft facets in computing. Besides involving technical aspects, software itself is developed and used by humans. As such, SE research employs qualitative methods in order to understand humans and the context within which their actions take place. Even though the importance of considering human aspects in SE research has gradually been acknowledged by SE community (Weinberg, 1971; Perry et al., 1994; Highsmith, 2002; Lenberg et al., 2015a), such research is still considered undeveloped (Lenberg et al., 2015b). This is due the fact that the level of knowledge and the number of reports on qualitative methods in SE are relatively low, as compared to another computing discipline namely information systems.

To date, only a few publications address qualitative methods in SE research. For instance, one paper provides an overview of qualitative data collection and analysis. The paper presents participant observation and interviewing as the data collection techniques and grounded theory for the data analysis (Seaman, 1999). Another paper defines qualitative research by emphasising the diversity of qualitative methods and how they are used under different epistemological orientations and with different theoretical stances (Dittrich et al., 2007). The paper proposes a common way to evaluate the quality of qualitative research. In addition, there are

also guidelines of using qualitative methods produced by SE researchers (Runeson & Höst, 2009; Stol et al., 2016; Sharp et al., 2016; Stol & Fitzgerald, 2018). Although useful, these guidelines have yet to cover the full extent of qualitative methods and the best practices of using them in SE research.

The social sciences have a long history of studying human behaviour, thus qualitative methods are a norm in their research. The most commonly used qualitative methods in social science research are grounded theory, thematic analysis, ethnography, phenomenology, narrative analysis and discourse analysis (Smith, 2007; Camic et al., 2003). On the other hand, grounded theory (Glaser & Strauss, 1967; Corbin & Strauss, 2015; Charmaz, 2014), thematic analysis (Braun & Clarke, 2006) and ethnography seem to be the most established qualitative methods in SE research (Dittrich et al, 2007; Adolph et al., 2012; Hoda et al., 2012; DeFranco & Laplante, 2017). This brings to the quality of SE research using grounded theory has been criticised (Stol et al., 2016; Sharp et al., 2016). Other methods such as phenomenology, narrative analysis or discourse analysis do not appear much in SE related publications, despite the fact that these methods bring similar values and could work as good as others (Chia, 2000; Boje et al., 2004; Czarniawska, 1997; Feldman et al., 2004; Weick, 1995; Gill, 2014).

Based on the success stories in social science research, it is believed that phenomenology, narrative analysis or discourse analysis could also contribute to understanding human aspects of SE, as well as grounded theory, thematic analysis and ethnography. Unfortunately, their potentials and values are yet to be explored or less reported in SE research. This paper aims to share some experiences of employing grounded theory and phenomenology in SE research. In fact, the methods were combined complementary together in one research project, which was conducted by the authors to address a SE issue. The sharing is based on the experience taken from the lens of novices.

2. Related Work

Grounded theory is a systematic qualitative method, which was originally introduced by Glaser and Strauss (1967) for social science research. It establishes the principle that researchers could generate valuable theoretical contributions to the subject matter through theory development, rather than theory testing. Grounded theory has several major variants, namely Classic (Glaser & Strauss, 1967); Evolved (Corbin & Strauss, 2015), Constructivist (Charmaz, 2014), Critical (Kempster & Parry, 2011; 2014; Oliver, 2012) and Regenerate or Situational Analysis (Clarke, 2005). In general, each later variant is an extension of the classic grounded theory introduced by Glaser and Strauss (1967).

The important principles in grounded theory include theoretical sampling, theoretical sensitivity and theoretical saturation, which are achieved through coding, memoing and constant comparison (Glaser, 1978; 1992; 1998; Strauss, 1987). The objective of grounded theory is to develop a cohesive theory by treating everything openly as data through continuous data analysis and theoretical coding. There are three basic layers of coding in grounded theory. First, examining and labelling the data as codes; second, coding groups the codes to constitute inclusive categories; and finally, establishing conceptual relations between codes by deciding the principal category that major categories can relate to. The interrelation between categories through theoretical coding becomes the cohesive theory that describes the phenomenon. In essence, grounded theory relies profoundly on the data originated from the field, which are particularly captured through interviews. It thus adopts an inductive paradigm with some deductive and abductive (Glaser, 1992; 1998). Coding happens soon after the data is collected and the process continues until the theoretical saturation is achieved.

Phenomenology carries data collection to understand the actual or daily experience of an individual regarding a concept or phenomenon (Van Manen, 2017). By combining the experiences of several individuals, the method describes the essence of the experiences in detail related to the phenomenon being studied (Creswell & Creswell 2018). It describes "what" individuals experience and "how" they experience it (Moustakas, 1994). The focus is on the meaning or true nature of the experience besides similarities or differences experienced by individuals regarding the phenomenon being studied (Creswell & Poth, 2018; Van Manen, 1990).

In carrying out a phenomenological study, researchers set aside their personal experience of the phenomenon being studied in order to focus on the experiences of the individuals involved. However, it does not mean that the researcher totally disregards what he or she knows, but rather not letting the knowledge influence the

process of determining the actual experience of the individuals (Creswell & Poth, 2018). Similar to other qualitative methods, phenomenology also involves researchers making interpretations based on the explanations that have been given (Heinonen, 2015; Moustakas, 1994).

There are two common types of phenomenology, namely hermeneutic phenomenology and transcendental phenomenology. Hermeneutic phenomenology is an approach that is oriented towards the actual experience and the interpretation of experiential texts (Creswell et al., 2007; Van Manen, 1990). It involves the art of understanding the actual experience of individuals so that the direct and indirect meanings behind them can be fully understood (Creswell et al., 2007). The researcher delves deeper into the phenomenon being studied during interviews with individuals. The important themes related to the experience are extracted to establish the basic structure of the experience. The individuals' experiences are described and interpreted based on the themes while maintaining a strong connection with the phenomenon being studied (Creswell et al., 2007; Heinonen, 2015). In contrast, transcendental phenomenology is less focused on the researcher's interpretation as in the case of hermeneutic phenomenology. The researcher does his or her best to set aside their knowledge and experience of the phenomenon. He or she needs to welcome the experiences told by the individuals about the phenomenon being studied. The described individuals' experiences are all considered as original and newly discovered. Considering the fact that researchers may have preconceptions obtained through background study, this process is undeniably difficult to achieve perfection (Moustakas, 1994).

Since phenomenology is a qualitative study, it uses non-probability sampling. This type of sampling is divided into several sampling techniques, namely simple, quota and purposive sampling (Creswell & Creswell, 2018). In phenomenology, there is no predetermined number of samples, but selecting the right individuals who can provide the experience meaningfully is vital. Although a large number of samples may provide more extensive data, the data from only a few people who actually experience the phenomenon and provide good details of the experience is considered sufficient to explain the phenomenon under study. As such, the suggested sample for phenomenology is from 1 to 10 people (Starks & Brown Trinidad, 2013). For the analysis, phenomenology breaks, interprets and explains data without distorting the overall context of the phenomenon being studied (Anosike et al., 2012; Groenewald, 2017; Moustakas, 1994).

Grounded theory was firstly applied in SE research for investigating the use of Computer-aided Software Engineering (CASE) (Orlikowski, 1993). Other SE research that adopted grounded theory include topics concerning requirements engineering, distributed development and agile development (Badreddin, 2013; Alqudah et al., 2019; Alqudah et al., 2023). Some experience of using grounded theory in SE research have also been reported (Razali et al., 2020). Unfortunately, SE research that employed phenomenology and described extensively the method in SE literature seems very scarce. If any SE research employs phenomenology, the study concerns SE education such as to understand the experience in teaching programming (Bagiati et al., 2011). For non-computing fields, research that investigated the use of both methods in one study is mainly from health studies such as nursing (Annells, 2006).

3. Methodology

This paper intends to outline the experience of using and combining phenomenology as well as grounded theory methods in one research project. The project was carried out to investigate a SE issue concerning legacy systems modernisation for citizen-centric digital government (Abu Bakar et al., 2022). The project involved two empirical studies, which were executed independently and separately. The first empirical study conducted data collection and analysis using phenomenology whereas the latter employed grounded theory. The output was the factors and elements contributing to legacy systems modernisation for citizen-centric digital government, which were consolidated as a framework for guiding practitioners to execute such initiatives.

Phenomenology was used in the first study with the objective to identify the modernisation factors for legacy systems in the public sector through the selected individuals' real experiences. The phenomenon was initially understood in-depth through the experience-telling process before the factors were identified. The project adopted hermeneutic phenomenology whereby besides gaining the actual experiences of the individuals, the experiences were interpreted in accordance with the needs of the project. The real experiences were interpreted

and described according to the factors related to legacy systems modernisation for citizen-centric digital government. The method enabled the collection of valuable real experiences from a number of individuals with extensive involvement in the subject matter. The selected individuals were experienced personnel who had handled maintenance, redevelopment or modernisation projects for public sector legacy systems. They shared their experiences in those projects including the tasks taken, the issues faced as well as the lessons learnt. The data collection was carried out through individual interviews of experienced practitioners from various public sector agencies.

Similarly, the second empirical study used grounded theory to identify the factors related to the development, modernisation or maintenance of legacy systems. The study mainly adopted the Evolved grounded theory (Corbin & Strauss, 2015) variant. The data collection for the study was done through individual interviews and focus groups with individuals from several public sector agencies, which were identified through theoretical sampling. Theoretical sampling is a special type of purposive sampling whereby sampling is based on the concepts emerge in the data. Due to that fact, the number of individuals in the second study was more than the first study before the findings evolved and eventually became narrowed and later theoretical saturated. Moreover, the number of individuals in the first study was lesser as the interviews were intensive and thus the saturation period reached faster. Although both studies were conducted by the same researchers, the samples in the first and second studies were different individuals. None of the individuals were interviewed twice.

By combining the findings of both empirical studies, a legacy systems modernisation framework for citizen-centric digital government was developed. At the initial stage, the data from both empirical studies were collected and analysed separately so that they did not affect or influence one another, besides ensuring comprehensive and detailed understandings were obtained in each study. After all, grounded theory discourages preconceptions or predetermined knowledge in order to avoid testing theories (Glaser, 1992; Corbin & Strauss, 2015). The findings from each study were then integrated during the development of the framework, as shown in Figure 1. This was achieved by comparing and linking the findings until they could be interpreted as a complete view of the subject matter. The research design used in the project was the convergent design, similar to the one in mixed methods (Creswell & Plano, 2018).

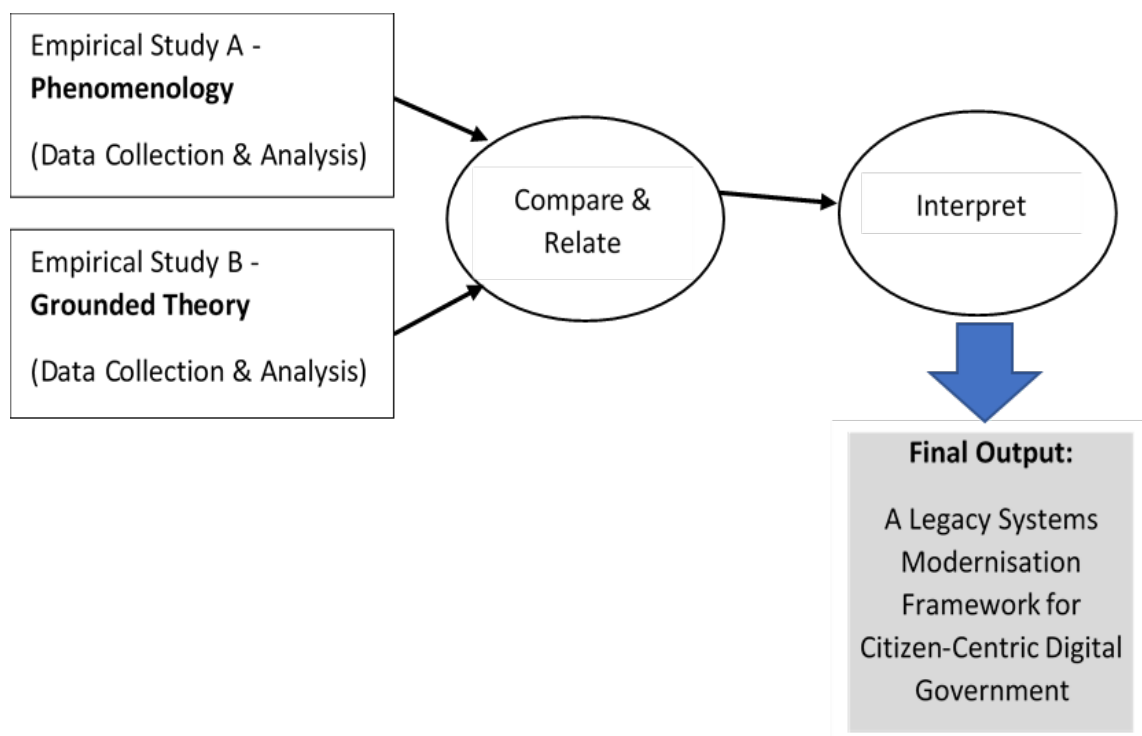


Figure 1: The Research Design

4. The Experience

The following paragraphs elaborate the experience of using phenomenology and grounded theory in one project, based on the reflections made by the authors as SE researchers who are novice phenomenology and grounded theory adopters.

Phenomenology was used in the project because the authors needed to understand in-depth the phenomenon under study through the individuals' actual experiences. The phenomenon under study in the project was so new where previous studies and references on them were almost non-existent. The method helped the authors to gather valuable experiences from a number of individuals who had been involved in the phenomenon during their career lives as practitioners in the field. The individuals had the opportunity to narrate each of those valuable experiences verbosely in a free-flow way. As such, the interview sessions appeared to be like informal story-telling meetings, which were more relaxing in nature. The environment had made the sessions to become fruitful with massive valuable data to be collected and analysed.

As practitioners themselves, the authors however had to reserve their personal experiences of the phenomenon as much as possible in order to capture genuinely the experiences of the individuals involved. They needed to be receptive when listening to the experiences shared by the individuals. The experiences were gathered as new and fresh, as the first time they were encountered. Having said that however, the authors found that some background information about the phenomenon was necessary to make the sessions productive by being objective. The background information however only acted as catalysts, rather than influencing the sharing. This was particularly helpful when the sharing went too far from the objective of the study or when the individuals were suddenly in silence due to loss of ideas.

Phenomenology relies on individuals' real-life experiences. As the phenomenon under study was new, the number of individuals who had the actual experiences in the phenomenon was limited. In fact, most of them obtained the experience through personal exposures or learning throughout their careers. The project managed to get five experienced individuals. Being an in-depth study, the sessions with five individuals were found to be adequate where most facts became saturated by the end of the fifth interview. Since SE practitioners are technical people, some of those individuals faced difficulties in articulating their experiences well and clearly. The authors had to play their roles well by giving scenarios or overviews that could trigger the individuals to elaborate and assist them in the explanation. This is an instance where the background information is highly needed to ensure the data collection process runs smoothly.

Due to the fact that phenomenology is uncommon in SE research, references on SE studies that employed this method were very limited. This situation had made the initiation stage not as easy as it was originally thought. Although the sessions were more conversational, the authors found that the data collection process was cognitive-intensive. The authors needed to give full attention when receiving and digesting the facts raised by the individuals. As the sharing was free-flow with very minimal interruption, the authors needed to instantly recognise which important facts that should be noted and which could be ignored, while ensuring the facts were still within the subject of interest. Moreover, the data analysis was challenging and time-consuming, especially during contextualising the data according to common themes and transforming the individual data into composite descriptions in order to provide a complete picture of the phenomenon being studied. This was particularly true as the individuals' experiences were somehow context-specific and personal where they shared based on what they had gone through, which were not quite the same from one to another. The authors had to be able to compare, contrast and later synthesise them to become the final interpretation.

On the other hand, grounded theory was employed in the project because the authors needed not only to explore the phenomenon in-depth but also with the intention to generate a theory about it. The goal of grounded theory is to go beyond the understanding of the phenomenon by producing a theory that describes comprehensively the phenomenon being studied. As novices, the authors faced some confusion when carrying out the method initially. In contrast to phenomenology, grounded theory imposes more stringent approaches towards data collection and analysis. Due to lack of references, the authors needed to acquire the skills the hard way by reading, doing and learning from the mistakes. In addition, there are several approaches in grounded

theory that originated from several schools of thought. This posed some dilemma to the authors about which grounded theory approach to better adopt.

Compared to phenomenology, the data collection and data analysis processes in grounded theory were more challenging. Grounded theory discouraged preconceptions, thus the authors needed to dwell into the data without being influenced by external sources and identified the relevant individuals through theoretical sampling. In fact, for the theoretical sampling, the appropriate individuals were only determined after the data analysis from each interview had been completed. This means it could not be pre-planned and thus the process was resource-intensive. In addition, the analysis process took a longer time because it involved three levels of systematic coding, namely open coding, axial coding and selective coding. In total, the study involved fourteen individuals before the theoretical saturation was achieved.

In the project, both methods were used complementary together to produce a more concrete and holistic outcome. The methods were initially employed independently in the respective concurrent studies where the data were collected and analysed individually by complying the methods' underlying principles. The authors started the empirical study that employed phenomenology earlier than the one that used grounded theory. To novices, this strategy turned out to be helpful because the former study offered the 'warming-up' field before embarking into the tougher one later. Since the first study was conducted earlier than the second one, one might argue that the first study would become prior knowledge to the second study. This situation was undeniably inevitable, but it was controlled strictly by having more than one researcher involved in the investigations, who cross-checked one another. After all, the second study adopted Evolved grounded theory, whereby it encourages a balance between keeping an open mind and recognising emerging noteworthy concepts. As such, literature review and existing knowledge are permissible provided that the researchers remain open to the data (Hughes & Jones, 2003; Hallberg, 2010; Dunne, 2011). The findings from both studies were then combined and conceptualised together under one interpretation. Similar concepts were grouped together using the appropriate labels and diverse concepts were reconceptualised to find the interconnections.

By having both methods together, some comparison can be made in terms of their similarities and differences. Being qualitative, both methods employ similar data collection techniques, mainly interviews. The difference is the way the interviews are conducted and the atmospheres. Phenomenology relies heavily on interviews as a sole means of data collection and thus the interview sessions are normally exhaustive. The focus remains centred on eliciting the experience of individuals so that the phenomenon could be revealed. As such, the atmosphere is more individual-centric whereby the individuals themselves determine the narratives of their experiences. Grounded theory on the other hand aims to discover and develop emerging theory that is grounded in the data, which means the interviews may not be the only means. The method has a systematic way of collecting and analysing data, the atmosphere is thus more directive and structured. Moreover, the analysis in phenomenology is retrospective transcript interpretation whereas grounded theory employs constant-comparative data analysis. The reflection in phenomenology happens during transcribing while in grounded theory, it occurs through memoing. The results of the analysis in phenomenology is a synthesis of interpreted meanings and in grounded theory, a substantive 'grounded' theory is produced. Combination of codes and memos are the substances that produce the concepts and eventually the theory. Despite the differences, both methods work quite well complementarily. Phenomenology allows the phenomenon under study to be appreciated deeply while grounded theory complements phenomenology by making sense of the phenomenon as a theory based on the grounded data.

Having to deal with both methods together was interesting, particularly when the convergent design was employed. The authors needed to learn-by-doing each study before strategising how to mix the two. In fact, the boundary of each study had to be strictly preserved in order to maintain its exclusiveness and to avoid one study influencing the other. In terms of the journey conducting a multimethod research (QUAL & QUAL) versus a mixed method research (QUAN & QUAL) as reported in previous study (Razali et al., 2016), the author found the former is more thought-provoking. The verbosity and subjectivity of the process were among the factors that contributed to the situation.

5. Conclusion

Adopting phenomenology and grounded theory in one research project is a challenging task but yet interesting. This paper has shared some experiences of using phenomenology and grounded theory in a study concerning a technical field, namely SE. Although the insights are not exhaustive, they provide some preliminary understanding of having both phenomenology and grounded theory as complementary methods in one SE research. Both methods have their respective underlying principles, which need to be understood and complied when such studies are being conducted together. Despite the fact that combining both methods can be very demanding, the effort is really worthwhile. The combination of two approaches provides several different perspectives about the phenomenon under study, which may not be achieved by one sole method. The experience shared in this paper could be viewed as opportunities to explore both methods in SE research in future.

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References

- Abu Bakar, H., Razali, R. and Jambari, D. I. (2002) "A Qualitative Study of Legacy Systems Modernisation for Citizen-Centric Digital Government". *Sustainability*, 14(17), 10951. <https://doi.org/10.3390/su141710951>
- Adolph, S., Kruchten, P. and Hall, W. (2012) "Reconciling Perspectives: A Grounded Theory of How People Manage the Process of Software Development". *Journal of Systems and Software*, 85(6), 1269–1286.
- Alqudah, M. K., Razali, R. and Alqudah, M. K. (2019) "Agile Methods Selection Model: A Grounded Theory Study". *International Journal of Advanced Computer Science and Applications*, 10(7), <http://dx.doi.org/10.14569/IJACSA.2019.0100749>
- Alqudah, M. K., Razali, R., Alqudah, M. K., Al Dalaien, M. N., Alabool, H. M., Alkhazaleh, H. A. (2023) "A Grounded Theory of Selecting Lean and Agile Practices for Software Development". *Journal of Software: Evolution and Process*, e2539, doi:10.1002/smr.2539
- Annels, M. (2006) "Triangulation of Qualitative Approaches: Hermeneutical Phenomenology and Grounded Theory". *Journal of Advanced Nursing*, 56, 55-61.
- Anosike, P., Ehrich, L. C. and Ahmed, P. (2012) "Phenomenology as a Method for Exploring Management Practice". *International Journal of Management Practice* 5(3), 205–224.
- Badreddin, O. (2013) "Thematic Review and Analysis of Grounded Theory Application in Software Engineering". *Advances in Software Engineering*. <https://doi.org/10.1155/2013/468021>
- Bagiati, A., Florou, C., Kosmopoulou, I. and Houstis, E. N. (2011) *Third Graders Experience on Using an Autodidactic Programming Software: A Phenomenological Perspective*. ASEE Annual Conference & Exposition, Vancouver.
- Boje, D. M., Oswick, C. and Ford, J. D. (2004) "Language and Organization: The Doing of Discourse". *Academy of Management Review*, 29(4), 571–577.
- Braun, V. and Clarke, V. (2006) "Using Thematic Analysis in Psychology". *Qualitative Research in Psychology*, 3(2), 77–101.
- Brown, R. B. (2006) *Doing your Dissertation in Business and Management: The Reality of Researching and Writing*. Cornwall, England: Sage.
- Charmaz, K. (2014) *Constructing Grounded Theory*. 2nd ed., London, England: Sage.
- Chia, R. (2000) "Discourse Analysis Organizational Analysis." *Organization* 7(3), 513–518.
- Clarke, A. E. (2005) *Situational Analysis: Grounded Theory after the Postmodern Turn*. Thousand Oaks, CA: Sage.
- Camic, P. M., Rhodes, J. E. and Yardley, L. E. (2003) "Qualitative Research in Psychology: Expanding Perspectives in Methodology and Design". American Psychological Association.
- Corbin, J. and Strauss, A. (2015) *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. 4th ed., Thousand Oaks, CA: Sage.
- Creswell, J. W. and Creswell, J. D. (2018) *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. 5th ed., Sage.
- Creswell, J. W. and Poth, C. N. (2018) *Qualitative Inquiry Research Design: Choosing Among Five Approaches*. 4th ed., Sage.
- Creswell, J. W., Hanson, W. E., Plano, V. L. C and Morales, A. (2007) "Qualitative Research Designs: Selection and Implementation". *The Counselling Psychologist*, 35(2), 236–264.
- Creswell, J. W. and Plano, V. L. C (2018) *Core Mixed Methods Design*. 3rd ed., Sage.
- Czarniawska, B. (1997) *A Narrative Approach to Organization Studies*. vol. 43, Sage.
- DeFranco, J. F. and Laplante, P. A. (2017) "A Content Analysis Process for Qualitative Software Engineering Research". *Innovations in Systems and Software Engineering*, 1–13.
- Dittrich, Y., John, M., Singer, J., Tessem, B. (2007) "For the Special Issue on Qualitative Software Engineering Research. *Information and Software Technology*, 49(6), 531–539.
- Dunne, C. (2011) "The Place of the Literature Review in Grounded Theory Research". *International Journal of Social Research Methodology*, 14, 111–124.

- Elliott, R., Fischer, C. T. and Rennie, D. L. (1999) "Evolving Guidelines for Publication of Qualitative Research Studies in Psychology and Related Fields". *British Journal of Clinical Psychology*, 38(3), 215–229.
- Feldman, M. S., Sköldbberg, K., Brown, R. N. and Horner, D. (2004) "Making Sense of Stories: A Rhetorical Approach to Narrative Analysis". *Journal of Public Administration Research and Theory*, 14(2), 147–170.
- Fossey, E., Harvey, C., McDermott, F. and Davidson, L. (2002) "Understanding and Evaluating Qualitative Research". *Australian and New Zealand Journal of Psychiatry*, 36(6), 717–732.
- Gill, M. J. (2014) "The Possibilities of Phenomenology for Organizational Research". *Organizational Research Methods*, 17(2), 118–137.
- Glaser, B. G. and Strauss, A. L. (1967) *The Discovery of Grounded Theory: Strategies for Qualitative Research*. Aldine de Gruyter, New York.
- Glaser, B. G. (1978) *Theoretical Sensitivity*. Sociology Press.
- Glaser, B. G. (1992) *Basics of Grounded Theory Analysis: Emergence vs Forcing*. Sociology Press.
- Glaser, B. G. (1998) *Doing Grounded Theory: Issues and Discussions*. Sociology Press.
- Groenewald, T. (2017) "A Phenomenological Research Design Illustrated". *International Journal of Qualitative Methods* 3(1), 42–55.
- Hallberg, L. R. M. (2010) "Some Thoughts about the Literature Review in Grounded Theory Studies", *International Journal of Qualitative Studies on Health and Well-Being*, 5(3). <https://doi.org/10.3402/qhw.v5i3.5387>
- Heinonen, K. (2015) "van Manen's Method and Reduction in a Phenomenological Hermeneutic Study". *Nurse Researcher*, 22(4), 35–41.
- Highsmith, J. (2002) *Agile Software Development Ecosystems*. Addison-Wesley Longman Publishing Co., Inc.
- Hoda, R., Noble, J. and Marshall, S. (2012) "Developing a Grounded Theory to Explain the Practices of Self-Organizing Agile Teams". *Empirical Software Engineering*, 17(6), 609–639.
- Hughes, J and Jones, S. (2003) "Reflections on the Use of Grounded Theory in Interpretive Information Systems Research," *Electronic Journal of Information Systems Evaluation*, 6(1).
- Kempster, S. and Parry, K. (2011) "Grounded Theory and Leadership Research: A Critical Realist Perspective". *The Leadership Quarterly*, 22, 106–120.
- Langley, A. (1999) "Strategies for Theorizing from Process Data". *Academy of Management Review*, 24(4), 691–710.
- Lenberg, P., Feldt, R. and Wallgren L. G. (2015a) "Human Factors Related Challenges in Software Engineering—An Industrial Perspective". *IEEE/ACM 8th International Workshop on Cooperative and Human Aspects of Software Engineering (CHASE)*, 43–49.
- Lenberg, P. and Feldt, R. and Wallgren L. G. (2015b) "Behavioral Software Engineering: A Definition and Systematic Literature Review". *Journal of Systems and Software*, 107, 15–37.
- Moustakas, C. 1994. *Phenomenological Research Methods*. Sage.
- Oliver, C. (2012) "Critical Realist Grounded Theory: A New Approach for Social Work Research". *British Journal of Social Work*, 42, 371–387.
- Orlikowski, W. J. (1993) "CASE Tools as Organizational Change: Investigating Incremental and Radical Changes in Systems Development". *MIS Quarterly*, 17(3), 309–340.
- Patton, M. Q. (1990) *Qualitative Evaluation and Research Methods*. Sage.
- Perry, D. E., Staudenmayer, N. A. and Votta L. G. (1994) "People, Organizations and Process Improvement". *IEEE Software*, 11(4), 36–45.
- Razali, R., Anwar, F., Rahman, M. and Ismail, F. F. (2016) "Mixed Methods Research: Insights from Requirements Engineering". *The Electronic Journal of Business Research Methods*, 14(2), 125-134, available online at www.ejbrm.com.
- Razali, R., Alqudah, M. K. and Zainal, D. A. P. (2020) "The Discovery of Grounded Theory Practices for Software Engineering Research". *The Electronic Journal of Business Research Methods*, 18(2), 153-165, available online at www.ejbrm.com.
- Runeson, P. and Höst, M. (2009) "Guidelines for Conducting and Reporting Case Study Research in Software Engineering". *Empirical Software Engineering*, 14(2) 131.
- Seaman, C. B. (1999) "Qualitative Methods in Empirical Studies of Software Engineering". *IEEE Transactions on Software Engineering*, 25(4), 557–572.
- Sharp, H., Dittrich, Y. and de Souza, C. R. (2016) "The Role of Ethnographic Studies in Empirical Software Engineering". *IEEE Transactions on Software Engineering*, 42(8), 786–804.
- Smith, J. A. (2007) *Qualitative Psychology: A Practical Guide to Research Methods*. Sage.
- Starks, H. and Brown T, S. (2013) "Choose Your Method: A Comparison of Phenomenology, Discourse Analysis and Grounded Theory". *Qualitative Health Research*, 17(10), 1372–1380.
- Stebbins, R. A. (2001) *Exploratory Research in the Social Sciences*. vol. 48, Sage.
- Stol, K., Fitzgerald, B. and Willig, C. (2013) *Introducing Qualitative Research in Psychology*. McGraw-Hill Education, Berkshire, UK.
- Stol, K., Ralph, P. and Fitzgerald, B. (2016) "Grounded Theory in Software Engineering Research: A Critical Review and Guidelines". *2016 IEEE/ACM 38th International Conference on Software Engineering (ICSE)*, Austin, TX, 2016, 120-131.
- Stol, K. and Fitzgerald, B. (2018) "The abc of Software Engineering Research." *ACM Transactions on Software Engineering and Methodology (TOSEM)*, 27(3), 1–51.
- Strauss, A. L. (1987) *Qualitative Analysis for Social Scientists*. Cambridge University Press.
- Van Manen, M. (2017). "But Is It Phenomenology?". *Qualitative Health Research*, 27(6), 775–779.

- Van Manen, M. (1990). *Researching Lived Experience: Human Science for An Action Sensitive Pedagogy*. State University of New York Press.
- Weick, K. N. (1995) *Sensemaking in Organizations*. vol. 3, Sage.
- Weinberg, G. M. (1971) *The Psychology of Computer Programming*. Van Nostrand Reinhold, New York.

The Rise and Fall of the Undergraduate Research Project

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Abstract: A project carried out as an independent piece of work, either by an individual student or a very small group, is often included in Business and Management degrees as a capstone activity. At undergraduate level historically the expectation in the British system is that some form of independent study is an essential part of an honours degree although typically this is not formally stated in university regulations. Historically such a project, even at undergraduate level, would have included an element of research and provided an opportunity for students to carry out their own inquiry into an area which had caught their interest. This provided students with research skills which could be adapted to carrying out some form of useful intellectual inquiry in their subsequent careers and gives them an opportunity to focus on particular areas where they have interests. Some students report finding the project a valuable source of material for subsequent job interviews. In recent years there has been a tangible move away from expecting students to do a project at undergraduate level. An effective project needs one-to-one supervision which often places a strain on faculty resources. It is hard to define exactly what would count as an acceptable level of independent scholarship for an undergraduate. It is very hard to ensure a consistently good student experience given a large group of supervisors and a wide range of subjects. Students frequently struggle to see the relevance of research methods to their intended careers. At its worst the project can appear to students as a time when they are left to their own devices with very little support and unclear expectations of what is required of them. Drawing on experiences from a UK business school with a large undergraduate cohort, where the policy up to now has been to retain an independent project in some form within students' final year, this paper discusses the challenges associated with the move away from independent projects and some ways in which they can be met.

Keywords: Undergraduate research, projects, relevance of research

1. Introduction and background

Individual projects carried out by students working independently have an important role within undergraduate education. While this is rarely a formal requirement imposed by university regulations, in the UK system there is a tacit assumption that an element of independent work is essential to achieve an honours degree, and this is in a context where an ordinary degree without honours is deemed to be indicative of a student who has not quite completed their course. It can act as a capstone where students have the opportunity to put into practice what they have learned earlier in their studies. It can provide them with an introduction to research and at the very least give them the discipline of writing an extended piece of work. It can even offer an opportunity, however tenuous, for students to become engaged with research carried out within the institutions where they study.

In Business and Management a project typically comprises an extended and analytical essay. There is rarely an opportunity to produce a tangible object (compared for example to Computer Science students who can build a prototype of a piece of software or hardware as an independent project) although students with an entrepreneurial slant can produce a proposal and perhaps the basis for a new business idea. Students interested in finance or in quantitative approaches to business can produce projects based on mathematical and statistical analysis, for example building new and distinctive models to explain observed phenomena. Those with access to willing participants for surveys or interviews can gather primary data, and often analyse it and relate it to concepts from a sub-discipline such as business strategy.

This leaves a significant number of students for whom there is no clear template for a Business or Management undergraduate project. Moreover it leaves considerable scope for writing descriptive work which might be good when regarded as purely an essay, but mediocre when regarded as a project and lacking in its fit with the aim for students to practise research skills and to build some sort of capstone. In a contemporary business school there are other activities, such as work-based learning, which more closely match the aim for students to put into practice the knowledge that they have acquired through their studies and these are potentially more valuable as a capstone element than a written project.

Moreover with a large number of Business and Management students in a typical undergraduate course there are severe limitations on the sort of resources needed to foster effective projects. Academic staff have little time for one-to-one supervision and except for the few occasions where students' work feeds directly into the supervisors' scholarship there are few clear benefits from engaging with undergraduate projects.

Therefore there are considerable attractions in moving away from the established approach to an independent project. This paper is based around the experience of one UK business school in making such a move. In the next section there is a discussion based around existing literature on the inclusion of independent projects and of related approaches such as work-based activities in the context of a business and management course. This is followed by an account of a business school's responses to the need to revise their approach to independent business and management projects and the paper concludes with some reflections relevant to possible next steps.

2. Literature on projects

There is a significant amount of established literature on students' experience of carrying out projects and the overlapping domain of how students can function as researchers in collaboration with faculty members. Much of this is relevant to undergraduate students in business schools. For the purposes of this discussion the term 'project' is used to refer to any type of extended independent work. In practice in a business school this and the term 'dissertation' are largely interchangeable, but the term 'dissertation' more specifically refers to an extended piece of written work whereas a 'project' could cover other types of deliverable such as an artefact, a piece of software, or even a performance. Webster et al (2000) focused on undergraduate and on a school of social sciences and law within a post-1992 university in the UK. This does not include a business school but given that management at least can be regarded as a social science their analysis has some relevance. A theme running through their account is the lack of consistency and in fact they observe in their conclusions a resistance among social science academics to introducing any sort of conformity in approaches to projects. Their recommendations therefore cover both the provision and publication of clear guidelines on what a project should contain, and guidance on how to deal with unusual projects which do not fit well with those guidelines. They also acknowledge the importance of a project to students, as an individual piece of work, and frame it in the context of a discussion of consistent academic standards. This was a key issue at the time that their paper was published and arguably has become even more important in the years since.

Feather et al (2014), also within a post-1992 university but this time within a business school, focus on the supervisor. They noted that many academics do value supervision of projects – which they nevertheless characterise as 'resource-hungry' – for the combination of skills that they provide to students. But they also discuss whether a project should be made voluntary for students or dropped altogether, and in their recommendations are broadly in favour of making it an option offered only to students who have attained a certain mark so far. They note that this would mean supervisors would typically get to work with the strongest students and thus those who were most rewarding to supervise, but implicit in that is that the students allowed to do projects would be the ones most able to benefit from the experience through producing high quality work.

The range of different approaches to Business and Management projects is also apparent in work by Malcolm (2012). She grounds her analysis in the nexus of teaching and research, significantly because it prompts a discussion of why the link between research and teaching is important and indeed whether it is essential to the nature of a university, and highlights different perceptions between students and their supervisors. There are subtle but significant differences in the way each of them frame the process of research, so for instance students are less comfortable than supervisors with a research process which is initially open-ended and which can develop as students find out more. Students are portrayed as fundamentally pragmatic and interested in an approach which would lead to completion of their degree in as straightforward and achievable a manner as possible.

The term 'capstone' frequently appears in the literature around undergraduate degrees, for instance when Starr-Glass (2020) discusses a capstone experience relevant to future employability which in fact follows the format of a conventional project. There are other potential ways in which a students can consolidate their learning and consider its application in the wider world. Work-based learning (Helyer and Kay, 2015) offers another approach and also exercises similar skills, for example in self-paced work and in project management, to those in a project. The extent to which research, as it is understood in an academic context, is applicable to many workplaces is contestable but as an example relevant to many Business and Management students' planned future careers Biggs (2010) devotes a whole section to research techniques for management consultancy. Modules based around work-based learning exist in many business schools: a recent conference presentation (Fischbacher-Smith et al, 2023) was an engaging account of one such activity based around close collaboration between students and employers.

It is difficult to quantify the scale of such activities but the Higher Education Statistics Agency (2023) does gather and publish data on the scale of universities' work with businesses and with other partners in the community. In 2021/22 consultancy contracts between businesses and UK universities had a value of over £550 million as just one indication of the importance of consultancy and business links to academia.

Yuan et al (2020) in a very different context – a university in Hong Kong and a Bachelor in Education – take an alternative perspective on research by undergraduates, relating it to critical thinking skills which are also essential for Business and Management students. One of their research questions specifically addresses their students' ability to transfer critical thinking skills to professional learning, a step analogous to students preparing for transition to the world of work. Another example from Asia is related by Pan et al, an international project-based learning programme where students can choose from a number of partners in business within which to work and a range of business issues to address. Other approaches to involving students in research involve students working as partners with academics, thus replicating in some ways a project where the student works on the supervisor's area of interest and in effect functions as a research assistant for them.

Other routes to building research into undergraduate studies include approaches where faculty members adopt more of a mentoring approach than the established project supervision approach (Smith et al, 2020) and focusing on those who will need to develop research skills because of an interest in potentially taking a PhD in the future (Ehrenberg, 2005). In an institution committed to supporting both its students' employability and the development of faculty these routes have considerable potential.

While individual projects can offer the opportunity for students to develop familiarity with practical business problems they are less well aligned with the need for them to develop 'soft skills' such as interpersonal and teamworking abilities and awareness of the cultural context within which they operate. This is an aspect of management education where employers' needs have become increasingly influential. Succi and Canovi (2020) discuss the difference between students' perspectives and those of employers, and highlight the difference in generation as well as the difference in perspective between the two groups. Nevertheless their findings suggest increased importance of soft skills perceived by employers and an increased imperative for universities to provide activities which offer these. A focus on graduate attributes (Allen and Simpson, 2019) provides an opportunity to connect the needs and perceptions of those involved and to focus the design and content of courses on what graduates should know and achieve.

3. Rethinking the undergraduate project: one business school's experience

This section covers the author's own experience of developing and adapting undergraduate project requirements. This is in the context of a business school offering a range of Business Management, Accounting, and Finance courses with a common theme that students until recently were always expected to produce a project with, as a guideline, a 10,000 word written report as part of their final year. As a possibly relevant aside, students on one particular Management course at the school were in the past (until 2010) offered the option of writing a significantly longer project and taking one fewer taught elective modules than their peers. Typically about 10% of each cohort took the long project, very often either those interested in pursuing a PhD subsequently or those with very clear connections with a business to which they could relate their project.

On a number of occasions during the period 2015-2020 the question of the nature and future of the undergraduate project was raised in discussions around the course structure. This resulted in introduction of a few specialist options within the standard framework of a 10,000 word written piece, including a more structured project for those specialising in accountancy and an option to work closely with businesses for those specialising in corporate social responsibility. Through all of this, and indeed through some significant revisions of other aspects of the courses, the assumption that there would be a 10,000 word project remained constant. When member of faculty questioned the importance of the project, partly prompted by the difficulty in identifying suitable supervisors, the leadership team (including the author) responsible for undergraduate teaching argued that it should remain. Arguments advanced for its continuation included references to (usually very strong) students who had used their projects as a stepping stone to being offered graduate employment and a principle that students should be encouraged to study beyond the formal material within the course. While there were strong concerns that projects were too varied to offer consistency either to students or supervisors, echoing earlier research on the role of the project (Webster et al, 2000) the leadership team recommended addressing this through more precise guidance, more writing workshops, and a measure of training in research methods.

By 2020 the internal landscape had changed further. It remained difficult to assign supervisors. More than that, in an environment where students were invited to choose from a range of broad areas in which to take their projects, there was a mismatch between areas of expertise among faculty and areas of interest to students. For example digital marketing proved to be a popular subject but students in this area were often assigned supervisors with no specialist knowledge either in digital business or in marketing, on the basis that supervision depended on a measure of familiarity with business as a whole and elementary research techniques. From the supervisors' perspective the role was downgraded, from something where they could share particular knowledge and their own interests, to the equivalent of an elementary management module. At the same time the university had set up an initiative to promote employability. A number of final year modules offered to students, principally as electives, offered opportunities for either practical work such as in a consultancy role with an external business, or for research including market research as one of a suite of specialised modules for marketing specialists.

This prompted some pragmatic moves around undergraduate students. The first of these affected finance specialists, and was the introduction of a shorter (5000 word) applied project as an alternative to the established longer project, with the students who took the shorter project expected to take one more elective module. In terms of degree structure and choices this amounted to reintroducing a similar approach to one which had been taken years earlier, with the optional longer project. Informed by research elsewhere that an optional project would best be confined to the strongest students (Feather et al, 2014), only those who had reached a threshold overall mark from their first two years equivalent to a good upper second class degree were permitted to do a longer project. About 60% of students specialising in finance have chosen the shorter applied project since it was introduced in 2021.

In contrast to management projects, where students were encouraged to collect primary data and where project briefings were carefully worded to disabuse anybody who thought that using secondary data only would be an easy approach, finance projects typically depended on finding new ways to analyse data such, as share prices or other financial indices, that is in the public domain. This allowed for a simple and accessible structure built around group supervision of finance projects, where a number of students working with the same supervisor would pursue the same exact subject, and would typically each apply a similar analysis to a distinct dataset. The use of group supervision introduced a further benefit compared to the conventional project where all supervision meetings were one-to-one, in that students had the opportunity to discuss techniques with one another and supervisors to explain research methods to several students at the same time.

Initial feedback on the shorter applied project was very positive, the more so because introduction of a more structured approach to supervision coincided with students' return to in-person study after the first wave of the pandemic. Therefore a natural next step was to introduce a shorter project as an alternative for management students, with similar conditions to ensure that only stronger students took the longer project. When this was initially proposed to colleagues the only possibly negative reaction was a suggestion that it should have been introduced years earlier, and this was implemented for management students starting from 2022. Because management projects were more diverse, it proved more difficult to identify a set of distinct subjects. So in practice, although the group supervision was carried over from the finance experience, the shorter applied projects for management students tended to be individual endeavours and group supervision sessions focused on more general issues around such as identifying a research question or choosing an appropriate methodology.

In practice the inclusion of a shorter applied project as an option for management students was essential to being able to deliver learning to final year students in by this stage. It made it feasible to structure supervision effectively, because supervisors with limited time could be allocated to the applied projects and had a finite amount of time to work with their students in groups. Nevertheless a number of problems continued. It remained difficult to allocate supervisors with relevant interests to the proportion of students who had still chosen the full project. The full, 10,000 word, project continued to attract a proportion of students who did little work on it until the very last few weeks, even though this was supposed to be distributed throughout their final year of study, and limiting the full project to those with stronger marks in their first two years did not eliminate this effect. Typically students who waited until the last minute gathered and analysed some useful data, but completed the work hastily so that the result was mediocre and did not reflect their abilities. A few students chose to switch between the full project and the shorter applied project once their final year of studies was underway, creating pedagogic uncertainty and typically administrative confusion as well.

At the same time, the university's employability agenda had an impact on undergraduate projects. Feedback from students in the National Student Survey and elsewhere suggested that final year students especially

wanted more contact with employers, and a greater emphasis on skills which they would build up through working with employers. The full-length final year projects which were done in conjunction with employers had generally resulted in a very high quality of work and a high level of engagement, although they were deliberately positioned as an option which a small number of students (often as few as 5% of the management students) would take. So a logical next step was to introduce shorter applied projects which had employer engagement built into them. Whereas the initial concept of the shorter project worked best with finance students relying on secondary data, a shorter project related directly to an employer works well for management students because the employer can typically provide primary data as well as access to a clearly defined research question. Nevertheless a number of employers in the finance sector have also worked with the university on defining requirements for applied projects.

Negotiations have already taken place with employers as part of the ongoing engagement which is already a key activity for a university teaching vocational subjects, and while it is impossible yet to predict the proportion the hope is for the majority of students coming into their final year of studies in 2023 and taking shorter applied projects to do these in conjunction with an employer. This fits well both with the principle behind the undergraduate course that students should be encouraged to go beyond the formally taught content and also the university's agenda around readiness for employment. As alluded to in some of the relevant literature this becomes closer to work-based learning than the established research-based project, and potentially is a more relevant and achievable way to bridge the gap between experience as a student and as in the workplace in the future.

The most recent step in the evolution of projects was to reconsider whether, in particular for management students, a project was necessary at all. Looking across the UK undergraduate sector as a whole, a project is no longer a universal part of honours degrees and other institutions either make it optional or do not offer it at all. Through successive changes it remained difficult to match supervisors to projects especially for management students. The business school has collected feedback from students on their individual project experiences and a proportion have questioned the value of the project in this context. Moreover there is now an established structure which allows students to choose different project approaches and different numbers of taught electives to attain the necessary number of credits for their final year. So the intention for the future is to move to a scenario where students have three options, to do a full 10,000 word project, to do a shorter applied project of 5000 words plus one additional elective, or to do no project at all and take two additional elective. This does have implications for the demand on elective modules and the need to accommodate larger numbers of students on these taught modules but preliminary modelling suggests that this is achievable.

4. Reflections and implications

The previous section has been presented deliberately as a chronological series of events and it is worth reflecting on some themes. Unfortunately the scope for formally evaluating the various changes is limited. The National Student Survey tracks the overall level of satisfaction of a final year cohort. The changes outlined above covered a period of considerable turbulence, including both recruiting an increased number of students and the impact on learning of the pandemic, so the fairly modest variations in survey scores achieved by the business school over this period could not be ascribed to any particular initiatives. The discursive comments collected as part of this survey and also those raised at staff-student meetings reveal that a significant number of students are unhappy about the level of preparedness provided by the university for independent work on the project. However they provide little clue as to how widely these concerns are held and the only observation which can be made with any certainty is that among the cohort there are some students for whom a project is extremely worthwhile and some for whom it is a frustrating and irrelevant exercise. The future of the project has been a consistent theme raised at various staff-student meetings over the years and in general the steps taken to change the provision and arrangements have reflected discussions there.

Over the years a sequence of relatively small incremental changes has led to a very considerable change in what is offered to students. While this has not altered the general focus of the degrees, in terms of either pedagogy of subject matter covered, it has been an important element in ensuring that they are contemporary and attuned to the requirements of the market within which the business school operates. And this has reflected a subtle but significant shift away from research skills, as historically understood in an academic context, to skills which are acquired through engagement with an employer.

So does research have a future in an undergraduate business degree, and if so is an independent project the best way to pursue it? There remains a strong case for students with an aptitude for individual research to be

encouraged to pursue it at undergraduate level, especially those who are likely to pursue further study or a research career. There are areas of specialised research, for instance market research as mentioned earlier in the context of students who have chosen to specialise in marketing. Consultancy, which is a popular destination for management students, has a tangible element of research and depends on skills around collecting and analysing data that are similar to those necessary to pursue scholarly research.

A well structured project can be an exceptionally effective way for students to build research skills: conversely a project which is done purely as a hurdle to be overcome can be a superficial exercise with little resultant learning. While there have been challenges around implementation a structure which gives students significant choice in the type of project to take and the amount of work involved appears to be the most constructive approach.

References

- Allen D and Simpson C (2019) Inquiry into graduate attributes: reviewing the formal and informal management curricula *Journal of management education* 43 (4) 330-358
- Biggs D (2010) *Management consulting: a guide for students* Andover. Cengage
- Ehrenberg R G (2005) Involving undergraduates in research to encourage them to undertake PhD study in economics *American economic review* 95 (2) 184-188
- Feather D, Anchor J, and Cowton C (2014) Supervisors' perceptions of the value of the undergraduate dissertation *International journal of management education* 12 (1) 14-21
- Fischbacher-Smith D, Li X, and Lombardo K (2023) An innovative approach to enhancing student learning through partnerships. Presentation at *Chartered association of business schools learning teaching and student experience conference*, Newport, Wales
- Helyer R and Kay J (2015) Building capabilities for the future in Helyer R (ed) *The work-based learning student handbook* London, Palgrave Macmillan
- Higher Education Statistics Agency (2023) *Business and community services* retrieved 22nd July 2023 from <https://www.hesa.ac.uk/data-and-analysis/business-community/services>
- Malcolm M (2012) Examining the implications of learner and supervisor perceptions of undergraduate dissertation research in business and management *Teaching in higher education* 17 (5) 565-576
- Pan G, Pow-Sun S, Shankaraman V, and Koh K (2021) Essence of partnership management in project-based learning: insights from a university's global project programme *Journal of international education in business* 14 (2) 297-319
- Smith C, Beltman S, Dinham J, Dobinson T, and Jay J (2020) Supporting undergraduate university students through instrumental mentoring *Australian journal of teacher education* 45 (1) 82-98
- Starr-Glass D (2020) The value of undergraduate capstone experiences: stepping stones to future organisational engagement *Development and learning in organisations* 34 (2) 29-32
- Succi C and Canovi M (2020) Soft skills to enhance graduate employability: comparing students and employers' perceptions *Studies in higher education* 45 (9) 1834-1847
- Webster F, Pepper D, and Jenkins A (2000) Assessing the undergraduate dissertation *Assessment & evaluation in higher education* 25 (1) 71-80
- Yuan R, Yang M, and Stapleton P (2020) Enhancing undergraduates' critical thinking through research engagement: a practitioner research approach *Thinking skills and creativity* 38 1-10

Contribution of Grounded Theory in Management Research Between 2013 and 2022: A Bibliometric Study

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Abstract: The importance attributed to the qualitative methodology has been increasing in recent years, since it is becoming consensual that it has a relevant role when one wants to deepen topics that are traditionally studied through methodologies anchored in the quantitative approach. This article aims to analyze the contribution of Grounded Theory (GT) in research in the field of management, since it is essential to begin to approach this area from methodologies that are more sensitive to the institutional and cultural context in which organizations are inserted. Therefore, it seeks to identify and justify the application of GT in this topic, since it is a methodology little explored in this area of knowledge, which emphasizes the relevance of taking stock of the articles published between 2013 and 2022. Through a bibliometric approach with the support of visual maps of the research indexed to the Web of Science, created with VOSViewer, it was intended to give a panoramic view of the studies published in this scientific area. The results indicate that although the number of published articles has been increasing in recent years, there are still few publications that use GT in the area of management, which may be due to the practical nature of management studies, where the measurement and analysis of numerical data are considered more objective and reliable. In addition, many management studies have tight timelines and limited budgets, which may make it difficult to implement such a resource-intensive approach. Nevertheless, GT contributes to generating new knowledge and insights in the field of management. By challenging existing theories, it fosters the development of new perspectives that enhance the understanding of organizational phenomena, which contributes to the advancement of knowledge in the field of management.

Keywords: Grounded theory, Qualitative research, Research methodology, Management research method.

1. Introduction

Born in 1967 by the hands of sociologists Glaser and Strauss, Grounded Theory (GT) became the first manifesto of the so-called renaissance of qualitative research. Motivated by inductive theorizing, these authors suggested a methodology to build conceptions and theoretical models based on empirical data, based on observed reality (Assimos and Pinto, 2022). Therefore, it does not focus on an existing theoretical view, but on constant comparative analyses that allow building a grounded theory (Niasse, 2023).

Similar to other qualitative approaches, data from GT can be collected from various sources, namely: interview, observation, document analysis, case study, focus group, and/or Delphi panel (Glaser, 2018). This approach can be applied to management, with the aim of gaining insights into the ways organizations function (Sato, 2019).

Data are analyzed to identify patterns and topics that emerge, and can be used to develop a theory of how management works in a particular context (Gligor et al., 2016). It can also be used to inform decision making and to guide organizational change, because when a specific management practice is effective in a particular context, it can be replicated in other organizations in similar contexts (Sato, 2019). Makri and Neely (2021) add that GT also helps to identify areas where more research is needed. Nevertheless, it is still little used in this area of knowledge, which is why it was considered pertinent to know its application in management. To this end, a bibliometric study was conducted on articles published in full-text in the Web of Science (WoS) between 2013 and 2022.

2. Literature review

2.1 Grounded theory

As previously stated, rather than imposing pre-existing theories or assumptions on the data, GT involves developing a theory from the data that are generated during the research process (Centeno et al., 2020). Data are analyzed in a systematic and iterative manner to develop categories and concepts that are used to develop a theory that builds on reality and explains the phenomena under study (Makri and Neely, 2021).

Being considered one of the purest forms of qualitative research, GT is operationalized through ten phases (Ligita et al., 2020):

1. Identification of the research area considering the dynamics of each object under study, in order to strengthen the disciplinary and interdisciplinary relations of the topics that may emerge;
2. Definition of the research question, which constitutes the starting point for theory building, guides the investigation and allows a preview of the phenomenon under study in its natural environment;
3. Selection of the instruments that will be used in data collection, so that the results are not biased;
4. Open coding (initial) to identify the concepts and their properties;
5. Recording of observations on the various phases of the GT construction process;
6. Theoretical sampling, which occurs when all categories are saturated in terms of properties and dimensions;
7. Axial coding that relates the categories to each other and associates them according to their properties and dimensions;
8. Selective coding (conceptual) that integrates and refines the theory around a concept;
9. Preparation of the report with the description of all phases and research processes;
10. Evaluation of the research with respect to the procedures and method used to generate the results.

Critical engagement in particular situations makes it possible to recognize the uniqueness of knowledge development and to assume that it is simultaneous and multiple. In this context, Clarke et al. (2018) argue that elements should not be analyzed in isolation, but rather interpreted in their connection to the whole, because things only have meaning when they are related to the situation in which they are found or in which they occur. According to the authors, it makes no sense to write a theory about something that is constantly changing, so all concepts must be continuously compared with the data that are collected.

2.2 Advantages and disadvantages of the Grounded theory

GT can be described as a method that aims to build a theory grounded in the observed reality from the collected data. Like any methodology, GT also has positive and negative points (Ássimos and Pinto, 2022).

The main advantages are the process of coding the variables that help to outline the research, the method of constant comparison that allows to delimit the data collection and the fact that the research continues until all categories are saturated in terms of properties and dimensions (Centeno et al., 2020). According to Ebrahimi (2020) the fact that it does not only contribute to enriching the data collected, but also to increasing its objectivity in terms of interpretation and discussion, is one of its added values. It also enables the development of explanatory models that are enhanced by the processes of data triangulation and/or theoretical saturation to build models that study situations in real contexts (Maupa and Abidin, 2020). This approach brings a number of operational advantages such as the process of coding the variables, the constant comparison method that aims for exhaustion of data collection, the coding process that helps outline the research, and theoretical sampling that looks for similarities with other studies (Makri and Neely, 2021). Considering that it is a dynamic and iterative process, it allows for greater flexibility in its approach, because it can be adapted as new data are collected and analyzed, and it provides a new perspective on a research problem (Niasse, 2023).

Despite its advantages, GT also has negatives points, among which are the difficult operationalization of the process and the dependence on the theoretical subjectivity of the researcher, since biases and preconceptions may influence the interpretation and analysis of the data (Kiger and Varpio, 2020). In addition, it requires a significant amount of time to collect and analyze the data, which can be a limitation for researchers who have limited resources or a tight schedule (Qureshi and Ünlü, 2020). Ligita et al. (2020), further state that GT usually involves a small sample size, which can limit the generalizability of the results. The fact that it is a process that relies on ongoing data collection and analysis, it can make it difficult to determine when to stop data collection.

After reading the abstract and taking into account the inclusion and exclusion criteria, 39 articles were selected, which met the research objectives. To systematize the article selection process, we used the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA; Rethlefsen et al., 2021) methodology, whose steps are shown in the flowchart in Figure 2.

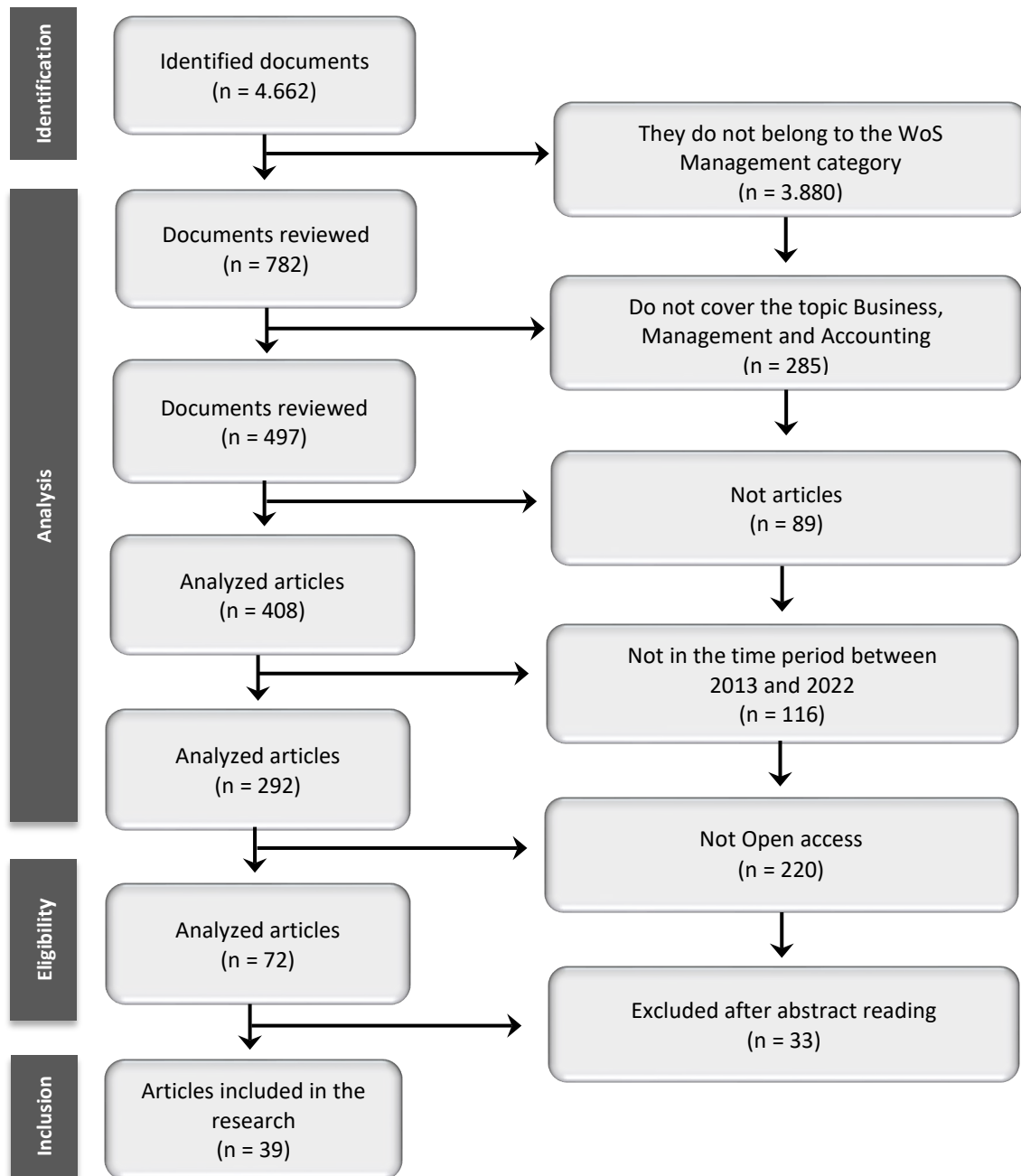


Figure 2: PRISMA Flowchart for selecting articles to be included in the research

The results showed that although the number of documents that relate the descriptors GT and Management has been growing in the last two years, it is quite scarce, and out of a universe of 4.662 documents, only 39 (3.1%) meet the inclusion and exclusion criteria (Figure 3).

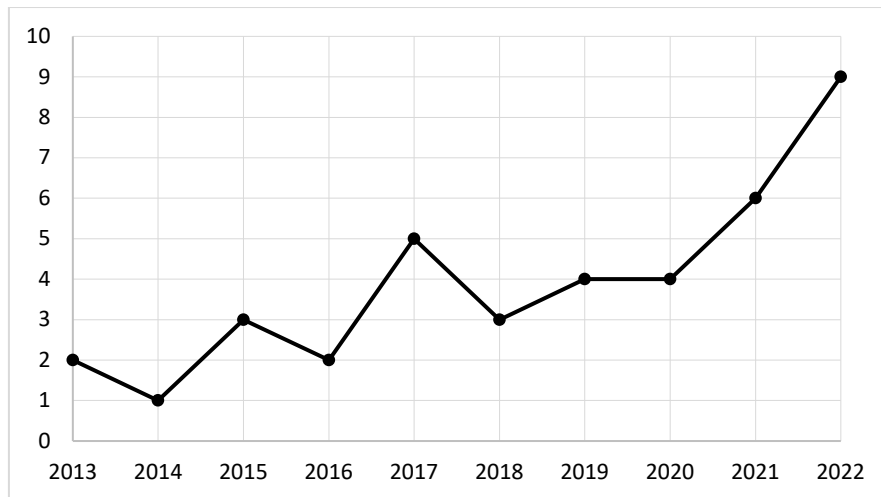


Figure 3: Articles published in full text between 2013 and 2022 that use GT in the field of Management

During this time period, a management research can be divided into five groups (Figure 4) directly related and mostly overlapping:

1. The red cluster is dedicated to strategic management and is composed of nine items encompassing the following keywords: decision making (Lynch and Barnes, 2020), entrepreneurship (Burgos et al., 2020), strategic change (Cunha et al., 2019), management ideas (Jha and Jacob, 2020), task performance (Douglas et al., 2022), and project management (Li et al., 2022).
2. The green cluster consists of nine items that address aspects related to operational management. This cluster covers the following descriptors: operational alignment (Bidmeshk et al., 2021), software development process (Chen et al., 2018), advanced management (Hanningan et al., 2019), target consumers (Kapoor et al., 2022), digital transformation (Krasonikolakis et al., 2020), organizational routines (Nair, 2021), and test preparation industry (Pandey et al., 2022).
3. The blue cluster encompasses seven items pertaining to change management. Key terms include: radical change (Bennett et al., 2018), skill development (De Vos et al., 2015), international projects (Klimkeit, 2013), organizational performance (Ndevu, 2019), and blended leadership (Painter-Morland and Deslandes, 2017).
4. The yellow cluster refers to innovation management and includes seven items, whose keywords cover: open innovation (De Aro and Perez, 2021), innovation success (Ibrahim, 2016), localized knowledge transfer (Iddy, 2021), global virtual teams (Mattarelli et al., 2017), open opportunities (Rogiers et al., 2021), business model innovation (Schaffer et al., 2022), and patterns of change (Sune and Gibb, 2015).
5. The purple cluster encompasses seven items related to international business and integrates the keywords related to mergers and acquisitions (Chakkol et al., 2018), international business (Chakkol et al., 2018), blending (Gregory et al., 2015), future trends (Hall and Rowland, 2016), and business growth programs (Pinnington et al., 2021).

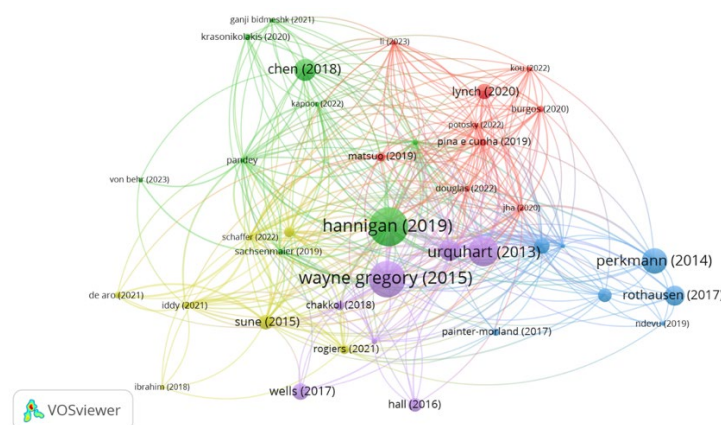


Figure 4: VOSViewer map of the articles selected for analysis

After organizing the articles into clusters, it was considered pertinent to develop a content analysis grid based on the following dimensions: thematic area, theoretical paradigm in methodological terms, data collection technique, data analysis procedures, participants, main results, and theoretical and practical contributions. At this moment the articles are being subjected to detailed analysis.

5. Final considerations

Bibliometric research makes it possible to delve into specific topics and identify what has already been published on a given topics, in a time period previously defined by the researcher (Quevedo-Silva et al., 2016). Based on this approach, we intended to analyze the contribution of GT in research in the field of management. The relevance of the study is related to the fact that this methodology uses the data collected during the research process to develop theories based on reality and explain the phenomena that occur in the organizational context in a substantiated way.

The research was operationalized through a bibliometric approach that used WoS to identify the articles published, in full text, in the management area between 2013 and 2022. Subsequently, VOSViewer was used to group the articles according to their thematic similarities. These visual maps revealed the existence of five clusters covering strategic management, operational management, change management, innovation management, and international business, respectively.

Data analysis revealed that publications using GT in management have been increasing in recent years. Nevertheless, the results showed that the number of articles resulting from the Boolean equation "Grounded theory" AND "Management" remains scarce, as it was found that in the last decade only 292 articles have been published in the area of Business, Management and Accounting, and only 72 are in open access. It should be noted that, due to the inclusion and exclusion criteria previously defined, the final sample was composed of 39 articles, since 33 did not meet the objectives of the study. The selected articles are still being analyzed.

Like any research, this one also has its limitations, namely the fact that the search was conducted only in WoS. Nevertheless, it is considered that this work contributes to highlighting the importance of GT in management, and to draw attention to the scarcity of existing studies. Given this evidence, it is suggested that in future studies we analyze to what extent the different phenomena that occur in organizations can be evaluated through GT and to what extent this approach contributes to the advancement of research in the management field.

It is expected that this work will contribute to encourage the use of this methodology in organizational contexts, since GT allows the construction of new theories that are based on the reality observed from the data collected.

References

- Ássimos, B. and Pinto, M. (2022) "Situational Analysis: Relevant Advances in Grounded Theory for Management Studies", *Organizações & Sociedade*, Vol. 29, No. 102, pp. 514-536. <https://doi.org/10.1590/1984-92302022v29n0023PT>
- Bennett, H., McCracken, M. and O’Kane, P. (2018) "Engage for change: The development of a Radical Change Engagement model", *Journal of General Management*, Vol. 43, No. 3, pp. 115-125. <https://doi.org/10.1177/0306307017749619>
- Bidmeshk, O., Mehraeen, M., Pooya, A. and Maharati, Y. (2021) "The FunCaps Framework: Reconceptualizing Operational Alignment", *Organizacija*, Vol. 54, No. 4, pp. 256-274. <https://doi.org/10.2478/orga-2021-0018>
- Burgos, J., Kittler, M. and Walsh, M. (2020) "Bounded rationality, capital budgeting decisions and small business", *Qualitative Research in Accounting & Management*, Vol. 17, No. 2, pp. 293-318. <https://doi.org/10.1108/QRAM-01-2019-0020>
- Centeno, A., Silva, L., Souza, I. and Reis, T. (2020) "Grounded Theory in Applied Social Sciences: A Study of Practices in Administration From", *Contribuciones a las Ciencias Sociales*, Vol. 67, No. 4, pp. 1-17.
- Chakkol, M., Finne, M., Raja, J. and Johnson, M. (2018) "Social capital is not for sale: a supply network perspective on mergers and acquisitions", *Supply Chain Management: An International Journal*, Vol. 23, No. 5, pp. 377-395. <https://doi.org/10.1108/SCM-02-2017-0052>
- Chen, H., Nunes, M., Ragsdell, G. and An, X. (2018) "Extrinsic and intrinsic motivation for experience grounded tacit knowledge sharing in Chinese software organisations", *Journal of Knowledge Management*, Vol. 22, No. 2, pp. 478-498. <https://doi.org/10.1108/jkm-03-2017-0101>
- Clarke, A., Friese, C. and Washburn R. (2018) "Situational analysis: grounded theory after the interpretative turn", Sage, Los Angeles.
- Cunha, M., Neves, P., Clegg., Costa, S. and Rego, A. (2019) "Paradoxes of organizational change in a merger contexto", *Qualitative Research in Organizations and Management: An International Journal*, Vol. 14, No. 3, pp. 217-240. <https://dx.doi.org/10.1108/QROM-05-2017-1532>.
- De Aro, E. and Perez, G. (2021) "Identification of dynamic capabilities in open innovation", *Innovation & Management Review*, Vol. 18, No. 2, pp. 118-128. <http://dx.doi.org/10.1108/INMR-10-2019-0120>

- De Vos, A., De Hauw, S. and Willemse, I. (2015) "An integrative model for competency development in organizations: The Flemish case", *The International Journal of Human Resource Management*, Vol. 26, No. 20, pp. 2543-2568.
<http://dx.doi.org/10.1080/09585192.2014.1003078>
- Donthu, N., Kumar, S., Mukherjee, D., Pandey, N. and Lim, W. (2021) "How to conduct a bibliometric analysis: An overview and guidelines", *Journal of Business Research*, Vol. 133, pp. 285-296. <https://doi.org/10.1016/j.jbusres.2021.04.070>
- Douglas, S., Merritt, D., Roberts, R. and Watkins, D. (2022) "Systemic leadership development: impact on organizational effectiveness", *International Journal of Organizational Analysis*, Vol. 30, No. 2, pp. 568-588.
<https://doi.org/10.1108/IJOA-05-2020-2184>
- Ebrahimi, M. (2020) "Grounded Theory in Practices of Technology Management". In M. Ebrahimim (Ed.), *Qualitative Exploration of Grounded Theory in Organizational Research* (Vol. 4, pp. 77-102). IGI Global, Pennsylvania, USA.
- Frandsen, T., Nielsen, M., Lindhardt, C. and Eriksen, M. (2020) "Using the full PICO model as a search tool for systematic reviews resulted in lower recall for some PICO elements", *Journal of Clinical Epidemiology*, Vol. 127, pp. 69-75.
<https://doi.org/10.1016/j.jclinepi.2020.07.005>
- Glaser, B. (2018) "Getting started", *The Grounded Theory Review*, Vol. 17, No. 1, pp. 3-6.
<https://doi.org/10.4324/9780429431821-4>
- Glaser, B. and Strauss, A. (1967) *The Discovery of Grounded Theory: strategies for qualitative research*, Aldine de Gruyter, New York.
- Gligor, D., Esmark, C. and Gölgeci, I. (2016) "Building international business theory: A grounded theory approach", *Journal of International Business Studies*, Vol. 47, pp. 93-111. <https://doi.org/10.1057/jibs.2015.35>
- Gregory, R., Keil, M., Muntermann, J. and Mähring, M. (2015) "Paradoxes and the nature of ambidexterity in IT transformation programs", *Information Systems Research*, Vol., 26, No. 1, pp. 57-80.
<http://dx.doi.org/10.1287/isre.2014.0554>
- Hall, R. and Rowland, C. (2016) "Leadership development for managers in turbulent times". *Journal of Management Development*, Vol. 35, No. 8, pp. 1-16. <http://dx.doi.org/10.1108/JMD-09-2015-0121>
- Hannigan, T., Haans, R., Vakili, K., Tchalian, H., Glaser, V., Wang, M., Kaplan, S. and Jennings, P. (2019) "Topic modeling in management research: Rendering new theory from textual data", *Academy of Management Annals*, Vol. 13, No. 2, pp. 586-632. <https://doi.org/10.5465/annals.2017.0099>
- Ibrahim, T. (2016) "The Impact of contemporary innovation management trends towards the organization of IT projects", *RISUS: Journal on Innovation and Sustainability*, Vol. 9, No. 2, pp. 78-93. <https://doi.org/10.24212/2179-3565.2018v9i2p78-93>
- Iddy, J. (2021) "Knowledge transfer mechanisms in franchise network", *Journal of Knowledge Management*, Vol. 25, No. 5, pp. 1006-1026. <https://doi.org/10.1108/JKM-03-2020-0195>
- Jha, H. and Jacob, D. (2020) "Legitimizing a practice across fields: microprocesses of theorization of Design Thinking", *Journal of Professions and Organization*, Vol. 7, No. 2, pp. 156-187. <https://dx.doi.org/10.1093/jpo/joaa007>
- Kapoor, S., Banerjee, S. and Signori, P. (2022) "The role of retailers during brand scandals: insights from a case study", *International Journal of Retail & Distribution Management*, Vol. 50, No. 2, pp. 276-298.
<https://doi.org/10.1108/IJRDM-04-2021-0153>
- Kiger, M. and Varpio, L. (2020) "Thematic analysis of qualitative data: AMEE Guide No. 131", *Medical teacher*, Vol. 42, No. 8, pp. 846-854. <https://doi.org/10.1080/0142159X.2020.1755030>
- Klimkeit, D. (2013) "Organizational context and collaboration on international projects: The case of a professional service firm", *International Journal of Project Management*, Vol. 31, No. 3, pp. 366-377.
<https://doi.org/10.1016/j.ijproman.2012.08.001>
- Krasonikolakis, I., Tsaropoulos, M., and Eng, T. (2020) "Are incumbent banks bygone in the face of digital transformation?", *Journal of General Management*, Vol. 46, No. 1, pp. 60-69.
<https://doi.org/10.1177/0306307020937883>
- Li, S., Martins, J., Vasconcelos, A. and Peng, G. (2023) "Knowledge sharing in project work: the dynamic interplay of knowledge domains and skills", *Journal of Knowledge Management*, Vol. 27, No. 2, pp. 328-355.
<https://doi.org/10.1108/JKM-06-2021-0455>
- Ligita, T., Harvey, N., Wicking, K., Nurjannah, I. and Francis, K. (2020), "A practical example of using theoretical sampling throughout a grounded theory study: A methodological paper", *Qualitative Research Journal*, Vol. 20, No. 1, pp. 116-126. <https://doi.org/10.1108/QRJ-07-2019-0059>
- Liu, W. (2019) "The data source of this study is Web of Science Core Collection? Not enough", *Scientometrics*, Vol. 121, No. 3, pp. 1815-1824. <https://doi.org/10.1007/s11192-019-03238-1>
- Lynch, S. and Barnes, L. (2020) "Omnichannel fashion retailing: examining the customer decision-making journey", *Journal of Fashion Marketing and Management: An International Journal*, Vol. 24, No. 3, pp. 471-493.
<https://doi.org/10.1108/JFMM-09-2019-0192>
- Makri, C. and Neely, A. (2021) "Grounded theory: A guide for exploratory studies in management research", *International Journal of Qualitative Methods*, Vol. 20, pp. 1-14. <http://doi.org/10.1177/16094069211013654>
- Mattarelli, E., Tagliaventi, M., Carli, G. and Gupta, A. (2017) "The role of brokers and social identities in the development of capabilities in global virtual teams", *Journal of International Management*, Vol. 23, No. 4, pp. 382-398.
<http://dx.doi.org/10.1016/j.intman.2017.01.003>
- Maupa, H. and Abidin, Z. (2020) "Grounded Theory in Management Research: A Literature Review", *American International Journal of Business Management*, Vol. 3, No. 12, pp. 21-26.

- Nair, L. (2021) "To discard or to add (a) pt? Looking at qualitative research templates through the lens of organizational routines", *Qualitative Research in Organizations and Management: An International Journal*, Vol. 16, No. 2, pp. 409-423. <https://doi.org/10.1108/QROM-09-2020-2021>
- Ndevu, Z. (2019) "Trust and organisational performance: A grounded theory approach for a South African district municipality", *SA Journal of Human Resource Management*, Vol. 17, No. 1, pp. 1-11. <https://doi.org/10.4102/sajhrm.v17i0.1158>
- Niasse, N. (2023) "Limiting Misleading ideas about the History of Grounded Theory Methodology", *International Journal of Qualitative Methods*, Vol. 22, pp. 1-9. <https://doi.org/10.1177/16094069211013654>
- Painter-Morland, M. and Deslandes, G. (2017) "Authentic leading as relational accountability: Facing up to the conflicting expectations of media leaders", *Leadership*, Vol. 13, No. 4, pp. 424-444. <https://doi.org/10.1177/1742715015578307>
- Pandey, J., Hassan, Y., Pandey, J., Pereira, V., Behl, A., Fischer, B. and Laker, B. (2022) "Leader signaled knowledge hiding and erosion of cocreated value: microfoundational evidence from the test preparation industry", *IEEE Transactions on Engineering Management* (published online). <https://doi.org/10.1109/TEM.2022.3149005>
- Pinnington, B., Lyons, A. and Meehan, J. (2021) "Value-independent third-party orchestrators as catalysts of business collaboration", *Journal of Management Inquiry*, Vol. 30, No. 4, pp. 438-453. <http://dx.doi.org/10.1177/1056492620959455>
- Quevedo-Silva, F., Santos, E., Brandão, M., and Vils, L. (2016) "Estudo bibliométrico: orientações sobre sua aplicação" [Bibliometric study: guidelines on its application], *Revista Brasileira de Marketing*, Vol. 15, No. 2, pp. 246-262. <https://doi.org/10.5585/remark.v15i2.3274>
- Qureshi, H. and Ünlü, Z. (2020) "Beyond the paradigm conflicts: A four-step coding instrument for grounded theory", *International Journal of Qualitative Methods*, Vol. 19, pp. 1-9. <https://doi.org/10.1177/1609406920928188>
- Rethlefsen, M., Kirtley, S., Waffenschmidt, S., Ayala, A., Moher, D., Page, M., Koffel, J. and PRISMA-S Group (2021) "PRISMA-S: an extension to the PRISMA Statement for Reporting Literature Searches in Systematic Reviews", *Systematic Reviews*, Vol. 10, No. 39, pp. 1-19. <https://doi.org/10.1186/s13643-020-01542-z>
- Rogiers, P., De Stobbeleir, K. and Viaene, S. (2021) "Stretch yourself: Benefits and burdens of job crafting that goes beyond the job", *Academy of Management Discoveries*, Vol. 7, No. 3, pp. 367-380. <https://doi.org/10.5465/amd.2019.0093>
- Sato, H. (2019) "Using grounded theory approach in management research", *Annals of Business Administrative Science*, Vol. 18, No. 2, pp. 65-74. <http://doi.org/10.7880/abas.0190326a>
- Schaffer, N., Hermes, S., Weking, J., Hein, A. and Krcmar, H. (2022) "Continuous Business Model Innovation And Dynamic Capabilities: The Case Of Cewe", *International Journal of Innovation Management*, Vol. 26, No. 6, pp. 1-43. <http://dx.doi.org/10.1142/S1363919622500384>
- Sune, A. and Gibb, J. (2015) "Dynamic capabilities as patterns of organizational change: An empirical study on transforming a firm's resource base", *Journal of Organizational Change Management*, Vol. 28, No. 2, pp. 213-231. <http://dx.doi.org/10.1108/JOCM-01-2015-0019>
- Williams, B. (2020) "Dimensions & VOSViewer bibliometrics in the reference interview", *Code4Lib Journal*, (published online).

Sustained Competitive Advantage and Complexity: A Configurational Approach

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Abstract: In recent years, Qualitative Comparative Analysis (QCA) has emerged as a research approach to get insight into social science and business complexity. In contrast to the inferential methods that measure the net effect of an independent variable into a dependent variable, the QCA approach uncovers the necessary and sufficient conditions leading to a desired outcome. This paper discusses complexity in social science and business from the QCA perspective. In this regard, there are three streams of literature in strategic management aiming to explain how some firms outperform others: Porter's competitive advantage approach, Barney's sustained competitive advantage perspective, and D'Aveni's temporary advantage. However, the sustained competitive advantage approach suggests that generating economic rents must be understood as a complex phenomenon characterised by three features: i) path dependency (e.g., some resources and capabilities can only be developed over long periods, ii) social complexity (e.g., it may not always be clear how some firms develop some capabilities in short to medium term), and iii) causal ambiguity (e.g., some resources and capabilities cannot be bought and sold in markets). Therefore, this framework draws from a complex (or complexity) process that establishes logical connections between combinations of causal conditions (i.e., resources and capabilities) and a desired outcome (i.e., economic rents). The research methodology for business from the QCA perspective thus may raise some critical questions: How do some firms accumulate and deploy resources and capabilities more efficiently than their competitors to internally (not in markets) acquire and sustain a competitive advantage? And what is the nature of a firm's economic rents? In short, this paper discusses the nature of sustained competitive advantage (i.e., desired outcome) as a complex process (and not as a linear process) in that some firms outperform others, managing and deploying different resources and capabilities (i.e., conditions).

Keywords: competitive advantage; sustained competitive advantage; complexity; configurational approach; Qualitative Comparative Analysis; fuzzy-set Qualitative Comparative Analysis.

1. Introduction

The Resource-based view (RBV) of the firm reveals how complexity may affect the development of sustained competitive advantage among firms that result from three characteristics (Barney, 1991, 1996): social complexity, causal complexity, and history dependence. Indeed, these characteristics featuring the process of developing a sustained competitive advantage imply that resources should be valuable, rare, inimitable, and non-substitutable (Barney, 1991). The concern is to understand the process through which firms profit from strategic resources in a way that is almost impossible for competitors to recognise how a sustained competitive advantage is developed. It is argued in this paper that the process through which firms develop a sustained competitive advantage is a complex process that can be analysed from the perspective of the configurational approach, namely the fuzzy-set Qualitative Comparative Analysis (fsQCA).

In this regard, the fuzzy-set Qualitative Comparative Analysis (fsQCA) allows testing theories based on Boolean algebra and set-theoretic relations, focusing on determining sufficient and necessary conditions for yielding a desired outcome (i.e., sustained competitive advantage). In this sense, firms (i.e., cases) can be compared to each other to study how resources and capabilities contribute to developing a sustained competitive advantage for appropriating rents in markets. It is argued in this paper that the process of developing a sustained competitive advantage is a complex phenomenon that may be focused on from the perspective of the fuzzy-set Qualitative Comparative Analysis (fsQCA).

The paper is organised as follows. The first part briefly discusses the central ideas for distinguishing the concept of competitive advantage and sustained competitive advantage. The second part analyses the problem of

complexity in social science and business, and how the fuzzy-set Qualitative Comparative Analysis (fsQCA) may deal with the complexity problem. Finally, the paper concludes with some remarks.

2. The nature of competitive advantage and sustained competitive advantage

There are three streams of literature in strategic management aiming to explain the nature of competitive advantage (Rodríguez et al., 2015). The first stream of literature concerns Michael E. Porter's notion of competitive advantage (Porter, 1980, 1981, 1985). The second stream of literature of Jay Barney and others emerges as a criticism of Porter's propositions on how some firms outperform others in markets (Barney, 1991; Peteraf, 1993; Rumelt, 1987; Teece et al., 1997; Wernerfelt, 1984). Finally, the third proposition concerns Richard A. D'Aveni and others that explain the nature of temporary advantage in hypercompetitive markets (D'Aveni, 1994; D'Aveni et al., 2010).

Nevertheless, from the tradition of the neoclassical theory, there are three main approaches in the industrial organisation or industrial economics influencing the development of strategic management (Barca, 2003). The first approach concerns the Structure-Conduct-Performance (SCP) perspective of the Harvard School of industrial economics which is mainly associated with Porter's tradition in strategic management. The second approach concerns the efficiency perspective of the Chicago School of industrial economics. Finally, the third approach concerns the game theory approach. However, the Structure-Conduct-Performance (SCP) perspective of the Harvard School was the most influential in strategic management during the decades of the 1970s and 1980s through Porter's work. Since then, Porter suggested that firms may acquire (that is to say appropriate) economic rents when they develop a competitive advantage. However, this idea was the central argument in Porter's work during those decades, revealing the importance of i) market power and ii) a firm's efficiency-building capabilities contributing to developing a competitive advantage (Barca, 2003). Indeed, the Structure-Conduct-Performance (SCP) approach suggests that the imperfect competition model of industrial organisation is an adequate theoretical framework to analyse firms' differentiation in profit performance within industries (Barca, 2003).

In this regard, the Structure-Conduct-Performance (SCP) paradigm analyses how some firms outperform others in different market structures and, thus, how to identify the competition forms that can deliver the best efficient resource allocation (Barca, 2003). In the same way, the Structure-Conduct-Performance (SCP) paradigm suggests that economic rents arise because firms in various forms of competition in markets depend on their market power and efficiency-building capabilities (Barca, 2003). Remember that in this approach, structure means markets, conduct means strategy, and performance means profits level. Consequently, this analysis suggests that the Structure-Conduct-Performance (SCP) paradigm aims to reveal the actual connections between structure and firm performance using the strategy adopted by firms. Indeed, this approach has primarily contributed to developing Industrial Economics.

Shortly speaking, from the Structure-Conduct-Performance (SCP) paradigm, it would be possible to explain profit differentiation among firms in any industry under the well-known Porter's five forces model, namely 1) entry of new competitors, 2) threat of substitutes, 3) bargaining power of buyers, 4) bargaining power of suppliers, and 5) rivalry among competitors (Porter, 1980, 1985).

On the other hand, the nature of sustained competitive advantage, framed into the Resource-based View (RBV) perspective, deals with the problem of complexity in strategic management (Barney, 1991). In this regard, the notion of sustained competitive advantage emerged as a criticism of Porter's competitive advantage model (Porter, 1980, 1981, 1985) that aimed to explain why some firms outperform others in competitive markets. Therefore, Barney and others criticise Porter's model of competitive advantage suggesting that a complete explanation of the nature of economic rents must be drawn from the notion of sustained competitive advantage (Wernerfelt, 1984; Teece et al., 1997; Peteraf, 1993; Rumelt, 1987; Kogut and Zander, 1992).

The Resource-Based View approach, alongside the Dynamic Capabilities and the Transaction Costs Theory, offers a different explanation of firm performance. The point in the Resource-Based View is that the strategy for acquiring economic rents must be through a process of developing a sustained competitive advantage. Nevertheless, in opposition to Porter's perspective, the main idea in the Resource-Based View suggests that firms have the possibility of internally (not in markets) and differently managing and deploying their resources and capabilities to acquire and sustain a competitive advantage (Barney, 1991; Wernerfelt, 1984). In the same way as a sustained competitive advantage, for example, the Transaction Costs Theory in this perspective explains how firms can internalise some specific assets to compete successfully in markets (Williamson, 1971, 1979). However, from the perspective of the Resource-Based View, an important assumption in this analysis is that

firms are heterogeneous. This assumption allows for explaining a central problem in strategic management, namely how a firm's persistent profit differentiation can be sustained in markets. Indeed, the nature of this assumption in the Resource-Based View suggests that some firms can accumulate and deploy resources and capabilities more efficiently than others (Wernerfelt, 1984). Consequently, the possibility of developing a sustained competitive advantage should be based on the resources controlled by the firm rather than its products supplied in markets (Wernerfelt, 1984).

It is important to keep in mind that to understand the source of a sustained competitive advantage, the Resource-Based View of the firm suggests that the control and deployment of firm resources must fulfil four attributes (Barney, 1991): resources must be valuable, rare, imperfectly imitable (i.e., subject to unique historical conditions, causal ambiguity and social complexity), and non-substitutable (i.e., able to be exploited by the firm) challenging the environmental explanation of Porter's five forces model. On the other hand, from the perspective of the Transaction Cost Theory, it is important to recall that i) governance (i.e., market, intermediate governance, and hierarchical governance), ii) opportunism, and iii) transaction-specific investment are three key concepts to determine which governance alternative is the best to outperform firm behaviour in specific markets (Barney and Clark, 2007). Indeed, this framework allows explaining how firms internalise strategic assets through alternative forms of governance to develop a sustained competitive advantage.

The Resource-Based View of the firm allows including in the same analysis the possibility of heterogeneous firms in terms of resources and capabilities they control and deploy characterised by a high degree of uncertainty. This principle implies two other characteristics for explaining firm performance: causal ambiguity and social complexity (Barney, 1991; Rumelt, 1984). Indeed, the Resource-Based View of the firm substitutes the typical neoclassical assumptions assumed by Porter's model for heterogeneity and imperfect mobility, resulting in a more comprehensive explanation of barriers to entry, barriers to mobility, and barriers to imitation as the primary sources of sustained competitive advantage (Barney, 1991). The main argument in this study is thus that the source of complexity when explaining a sustained competitive advantage lies in some feedback effects, time delays and nonlinearities influencing firm performance. In the same way, strategic decisions contribute to creating resources and capabilities through a process characterised by i) path dependency (e.g., some resources and capabilities can only be developed over long periods, ii) social complexity (e.g., it may not always be clear how to develop some capabilities in short to medium term), iii) causal ambiguity (e.g., some resources and capabilities cannot be bought and sold) to explain the importance of asset specificity and supply inelasticity as a source of sustained competitive advantage (Barney, 1991). In this regard, the notion of sustained competitive advantage emerged as a criticism of Porter's model and, therefore, as a more comprehensive explanation of the nature of rents. It is worth saying that Richard A. D'Aveni and others (1994, 2010) argue that in hypercompetitive markets, economic rents could only be explained as a result of temporary advantage development.

In short, from the discussion of the nature of competitive advantage and sustained competitive advantage, the analysis of profitability among firms was primarily focused on two critical questions. The first question concerns on what is the nature of rents. And, the second question is how firms may appropriate rents. That is to say, the analysis of the nature and appropriability of rents. Or, in other words, raising two questions: how do some firms persistently outperform their market competitors? and what is the nature of firms' economic rents when developing their market activities? The first question concerns the possibility of firms creating a sustained competitive advantage. The second question inquiries about the nature of rents earned by the firm (e.g., Ricardian rents due to differentiation in quality that might be observed in some resources, monopoly rents due to firm ownership of some resources, or Schumpeterian rents due to the innovative position of some firms in markets) (Keyhani et al., 2015; Mahoney and Pandian, 1992; Makadok, 2001). It is important to mention that monopoly rents are primarily associated with Porter's concept of competitive advantage, Ricardian rents and Schumpeterian rents are primarily associated with Barney's concept of sustained competitive advantage, and Schumpeterian rents are primarily associated with D'Aveni concept of temporary rents.

Finally, it is important to keep in mind that the Resource-Based View of the firm is today a broader theory in that there are a lot of important authors and contributions to developing this approach. For example, Oliver Williamson (1971, 1979) with the Transaction Cost Theory, contributed to understanding how firms internalise strategic resources to acquire an economic rent. In the same way, Diericks and Cool (1989), Peteraf (1993), Rumelt (1987), and Wernerfelt (1984) contributed to getting insight into the nature of sustained competitive advantage. Or, the works of Helfat (1997), Prahalad and Hamel (1990), and Teece, Pisano and Shuen (1997) enhanced this analysis with the theory of dynamic capabilities. Shortly speaking, the discussion on the sustained competitive advantage (or the competitive advantage) is about how and when firms can develop an advantage to appropriate rents, namely in markets or when they make strategic decisions for producing.

However, in this presentation, it is argued that the Qualitative Comparative Analysis (QCA) approach in research (also known as a Configurational approach in social science and business) is a suitable method to inquire about complexity, and thus, in strategic management and business, on the nature of sustained competitive advantage and rents.

In this regard, from an empirical perspective, the debate on the nature of competitive advantage also implies inquiring about appropriate research methods that allow getting insight into how a competitive advantage is developed and the nature of rents. As you know, the problem here is that when a sustained competitive advantage is developed, traditional research methods (i.e., inferential statistics) are challenging to apply because data is not available or the context in which this information is generated changes rapidly (and thus data is not comparable!).

3. QCA research methods and complexity

As it was discussed in the previous section, the Resource-Based View model in strategic management has adopted a different perspective to explain the nature of rents and, thus, the nature of sustained competitive advantage. In the Resource-Based View model, resources are valuable, rare, inimitable, and non-substitutable. In addition, this approach suggests that the nature of a sustained competitive advantage is based on three crucial principles: i) the notion of causal ambiguity, ii) the notion of social complexity, and iii) the notion of path dependency (Barney, 1991, 1995). Indeed, the first two principles, taken together, imply that the process from which a sustained competitive advantage is developed follows a complex process. Furthermore, this principle is highly important in the strategic management analysis when defining strategic decisions if firms want to be successful in markets. Furthermore, from the Resource-Based View perspective, the analysis of a sustained competitive advantage implies that some resources are idiosyncratic to the firm as they result from being valuable, rare, inimitable, and non-substitutable (Barney, 1991, 1996). For example, inimitability in the Resource-Based View model results from three characteristics: i) social complexity, ii) causal ambiguity, and iii) history dependent.

This explanation reveals that a sustained competitive advantage draws from a complex (or complexity) process for developing such an advantage. Thus, the point here is to understand this process through which firms profit from strategic resources in a way that is almost impossible for competitors to recognise how a sustained competitive advantage is developed. Interesting, in the explanation of the nature of a sustained competitive advantage in the Dynamic Capabilities approach, neither the firm nor competitors frequently do not know how a sustained competitive advantage is developed (Teece et al., 1997).

In this regard, it is argued in this analysis that the Qualitative Comparative Analysis (QCA) approach is an adequate research method to deal with complexity in strategic management. Qualitative Comparative Analysis (QCA) seeks to establish logical connections between combinations of causal conditions and an outcome (Mendel and Korjani, 2013). For example, Parente and Federo (2019) offer the essence of the Qualitative Comparative Analysis approach suggesting that complexity in management sciences could be treated from the QCA perspective: “[The] purpose of this paper is to critically reflect and offer insights on how to justify the use of qualitative comparative analysis (QCA) as a research method for understanding the complexity of organisational phenomena, by applying the principles of the neo-configurational approach.” (Parente and Federo, 2019). Indeed, the Qualitative Comparative Analysis (QCA) perspective can only make sense if the phenomenon of interest has two features (Oana et al., 2021): i) it is plausible to frame it in terms of set relations, and ii) it is plausible to frame it in terms of causal complexity.

The characteristics of Qualitative Comparative Analysis (QCA) research imply that i) it is oriented toward explaining an outcome, ii) it is case-oriented, iii) it has a set-theoretic foundation, and iv) it is approached to modelling causal complexity. In this way, Parente and Federo (2019) explain how complexity is guided by three principles: conjunctural causation, equifinality, and asymmetry. Conjunctural causation refers to an outcome occurring from the interdependence of multiple conditions (or it considers that a single condition is frequently insufficient and must be combined with another to achieve the desired outcome). Equifinality concerns the possibility of multiple pathways leading to the same outcome (or it considers more than one sufficient (but not necessary) condition to produce an outcome). Finally, asymmetry means that attributes “found to be causally related in one configuration may be unrelated or even inversely related in another” (or knowing the causes of an outcome does not necessarily imply that the opposite outcome is equally known) (Meyer et al., 1993). These principles are at the core of QCA analyses when complexity is considered. Hence, when using the Qualitative Comparative Analysis (QCA) approach in strategic management analysis, it is possible to compare and examine

cases with different sets of causally relevant conditions to identify the decisive configurations and thereby unravel causal complexity by capturing the three principles before, namely conjunction, equifinality, and asymmetry (Ragin, 2008).

Indeed, the Qualitative Comparative Analysis (QCA) approach tests theories based on Boolean algebra and set-theoretic relations, focusing on determining sufficient and necessary conditions for yielding the desired outcome (i.e., sustained competitive advantage). In so doing, the Qualitative Comparative Analysis (QCA) approach uses two parameters to measure the necessary and sufficient conditions for achieving the desired outcome (Parente and Federo, 2019): consistency and coverage. Consistency measures the extent to which the terms of a solution are a subset of the result (i.e., a measure of fit among different conditions comprising a configuration yielding an outcome), and coverage indicates the proportion of cases that take a particular path to obtain a specific outcome (Parente and Federo, 2019).

On the other hand, the research questions typically raised in Qualitative Comparative Analysis (QCA) research are focused on causes-of-effects type (vs. effects-of-causes) that ask for the reasons why certain phenomena occur. Finally, Qualitative Comparative Analysis (QCA) undertakes any research following three precise steps (Oana et al., 2021): before the Analytical Moment, during the Analytical Moment, and after the Analytical Moment. Before the Analytical Moment, the task to develop is the research design (i.e., the definition of truth tables, set membership, calibration, gathering raw data, case selection, and definition of conditions) (Oana et al., 2021). During the Analytical Moment, the necessary and/or sufficient conditions are defined (i.e., superset or subset) (Oana et al., 2021). Finally, after the Analytical Moment, the tasks are diagnostics and checking the robustness of the results (Oana et al., 2021).

4. Conclusion

The paper analysed the process of developing a sustained competitive advantage from the perspective of the Resource-based View (RBV) of the firm. From this perspective, resources controlled and deployed by the firm are valuable, rare, inimitable, and non-substitutable (Barney, 1991). Also, from this perspective, the process through which a sustained competitive advantage is developed is characterised to be a complex process (i.e., social complexity, causal ambiguity, and history-dependent). These features suggest the need for applying an adequate methodology to get insight into these phenomena. It is argued in this paper that fuzzy-set Qualitative Comparative Analysis (fsQCA) methods may contribute to revealing the nature of the complex processes when developing a sustained competitive advantage by firms.

References

- Barca, M. (2003) *Economic Foundations of Strategic Management*, Ashgate, Hants/Burlington.
- Barney, J.B. (1991) "Firm resources and sustained competitive advantage", *Journal of Management*, Vol. 17, No. 1, pp.99–120.
- Barney, J.B. (1996) "The resource-based theory of the firm", *Organization Science*, Vol. 7, No. 5, pp.469–496.
- Barney, J.B. and Clark, D.N. (2007) *Resource-Based Theory: Creating and Sustaining Competitive Advantage*, Oxford University Press, Oxford/New York.
- D'Aveni, R.A. (1994) *Hypercompetition: Managing the Dynamics of Strategic Maneuvering*, Free Press, New York.
- D'Aveni, R.A., Dagnino, G.B. and Smith, K.G. (2010) "The age of temporary advantage", *Strategic Management Journal*, Vol. 31, No. 13, pp.1371–1385.
- Dierickx, I. and Cool, K. (1989) "Asset stock accumulation and sustainability of competitive advantage", *Management Science*, Vol. 35, No. 12, pp.1504–1511.
- Helfat, C.E., Finkelstein, S., Mitchell, W., Peteraf, M.A., Singh, H., Teece, D.J. and Winter, S.G. (2007) *Dynamic Capabilities: Understanding Strategic Change in Organizations*, Blackwell Publishing, Malden/Oxford/Victoria.
- Keyhani, M., Lévesque, M. and Madhok, A. (2015) "Toward a theory of entrepreneurial rents: a simulation of the market process", *Strategic Management Journal*, Vol. 36, No. 1, pp.76–96.
- Kogut, B. and Zander, U. (1992) "Knowledge of the firm, combinative capabilities, and the replication of technology", *Organization Science*, Vol. 3, No. 3, pp.383–397.
- Mahoney, J.T. and Pandian, J.R. (1992) "The resource-based view within the conversation of strategic management", *Strategic Management Journal*, Vol. 13, No. 5, pp.363–380.
- Makadok, R. (2001) "Toward a synthesis of the resource-based and dynamic-capability views of rent creation", *Strategic Management Journal*, Vol. 22, No. 5, pp.387–401.
- Mendel, J. M. and Korjani, M. M. (2013) "Theoretical aspects of fuzzy set qualitative comparative analysis (fsQCA)", *Information Sciences*, Vol. 237, pp.137–161.
- Meyer, A. D., Tsui, A. S. and Hinings, C. R. (1993) "Configurational approaches to organizational analysis", *Academy of Management Journal*, Vol. 36, pp.1175–1195.

- Oana, I.E., Schneider, C.Q. and Thomann, E. (2021) *Qualitative Comparative Analysis Using R: A Beginner's Guide*, Cambridge University Press, Cambridge/New York.
- Parente, T.C. and Federo, R. (2019) "Qualitative comparative analysis: justifying a neo-configurational approach in managing research", *RAUSP Management Journal*, Vol. 54, No. 4, pp.399-412.
- Peteraf, M.A. (1993) "The cornerstone of competitive advantage: a resource-based view", *Strategic Management Journal*, Vol. 14, No. 3, pp.179-191.
- Porter, M.E. (1980) *Competitive Strategy*, Free Press, New York.
- Porter, M.E. (1981) "The contribution of industrial organization to strategic management", *Academy of Management Review*, Vol. 6, No. 4, pp.609-620.
- Porter, M.E. (1985) *Competitive Advantage*, Free Press, New York.
- Prahalad, C.K. and Hamel, G. (1990) "The core competence of the corporation", *Harvard Business Review*, Vol. 68, No. 3, pp.79-91.
- Ragin, C.C. (2008) *Redesigning Social Inquiry: Fuzzy Sets and Beyond*, University of Chicago Press, Chicago.
- Rodríguez, J.C., Gómez, M. and Ramírez, K.N. (2015) "Competitive advantage in knowledge-based firms of emerging economies: evidence from Mexico", *International Journal of Globalisation and Small Business*, Vol. 7, No. 1, pp.39-58.
- Rumelt, R.P. (1984) Towards a strategic theory of the firm, in Lamb, R.B. (Ed.), *Competitive Strategic Management*, Prentice-Hall, Englewood Cliffs.
- Rumelt, R.P. (1987) Theory, strategy and entrepreneurship, in Teece, D.J. (Ed.), *The Competitive Challenge*, Ballinger, Cambridge.
- Teece, D.J., Pisano, G. and Shuen, A. (1997) "Dynamic capabilities and strategic management", *Strategic Management Journal*, Vol. 18, No. 7, pp.509-533.
- Wernerfelt, B. (1984) "A resource-based view of the firm", *Strategic Management Journal*, Vol. 5, No. 2, pp.171-180.
- Williamson, O.E. (1971) "The vertical integration of production: market failure considerations", *American Economic Review*, Vol. 61, No. 2, pp.112-123.
- Williamson, O.E. (1979) "Transaction-cost economies: the governance of contractual relations", *Law and Economics*, Vol. 22, No. 2, pp.233-261.

An Exploratory Sequential Mixed Methods Design to Identify Criteria for Continuous Performance Evaluation

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Abstract: An alternative to the ubiquitous annual performance evaluation is continuous performance evaluation that is posed to give more objective, frequent and constructive feedbacks. Despite researchers recommending following a continuous performance evaluation for employees, there are hardly any progress in this regard. One of the hindrances is in identifying the evaluation criteria. Identifying the relevant criteria – both from employers and employee’s perspective – is important for the success of a continuous performance evaluation process. Given its novelty, it calls for an exploration to understand a holistic set of criteria. For this purpose, an exploratory sequential mixed method was adopted in the Information Technology Industry in India. In the first phase, an unstructured interview was conducted among 11 software engineers (employees). Based on the responses, a semi-structured interview was conducted among 52 software engineers. A qualitative content analysis of the interview transcripts resulted in 33 criteria. Criteria that were similar, synonymous and complementary were combined. An acceptable interrater reliability was obtained in the content coding and categorization process (Krippendorff’s $\alpha = 0.822$). This was followed by a focus group discussion among employers (represented by 15 project managers) and 11 criteria were eliminated and seven were added. In the second phase, the importance of 28 criteria were sought using a questionnaire based survey. A simple random sampling was adopted and 498 responses were received. (Cronbach’s $\alpha = 0.786$). After elimination for incompleteness and erratic information, responses from 443 participants were considered for quantitative analysis. An exploratory factor analysis was conducted on the responses with 28 criteria subjected to exploratory factor analysis. Two criteria were not included for analysis due to a low mean sampling error value. The 26 most relevant criteria were categorized into six factors based on their factor loading. The main criteria factors were titled: Diagnostic, Dynamic, Proactive, Prompt, Resourceful and Responsible. These factors and the criteria within these factors can be used for continuously evaluating the performance of employees.

Keywords: Continuous Performance Evaluation, Criteria for evaluation, Exploratory sequential method, Mixed Method, Software engineer, Reward and Recognition

1. Introduction

Performance evaluation of employees is an important step in measuring the employee productivity. Such evaluations are in general conducted annually using a performance appraisal system (PAS) (Pichler, 2012). The annual appraisal using PAS has two major drawbacks (Schraeder, Becton and Portis, 2007; Lunenburg, 2012). First, the long frequency of the appraisal process (Nelson, 2000). As it is an annual affair, errors such as subjectivity, recency error, bias, halo effect, stereotyping creeps in, resulting in improper evaluations (Boice and Kleiner, 1997). Second, there is a stubborn fixation regarding target or goal achievement (Niven and Lamorte, 2016). These drawbacks can be addressed to an extent by having an ongoing or continuous method for performance evaluation of employees (Sreejith, 2015). While achieving the targets or goals that are usually fixed at the beginning of the appraisal period are important (Sahai and Srivastava, 2012), any steps towards achieving such goals are equally important. Hence there is a need for continuous performance evaluation of employees (CPEE).

Although the importance of CPEE has been highlighted by researchers, there is no known process by which CPEE could be operationalized. In order to implement and sustain, any organizational process, it should produce certain periodic outputs (Guerra-López and Hutchinson, 2013), which is meaningful to its administrators and beneficiaries. One such output of CPEE could be to offer a proper and timely rewards and recognition (R&R) for the employees. R&R is a motivational tool used for appreciation which could boost employee performance and productivity (Hansen, Smith and Hansen, 2002). Research underline that R&R is strongly and positively correlated to the performance of employees (Balakrishnan, Soundararajan and Parayitam, 2022).

R&R is often masqueraded as employee awards. Employee awards often follow a standard operating procedure and highly formal in nature. In general, the employee awards are based on nominations from the managers, which are scrutinized by an individual committee and one among the several nominated employees is offered the award (London and Higgot, 1997). Employees are often clueless about what about their performance fetched them the award. In other words the criteria for such awards are often unknown. Similar to PAS, the criteria for such evaluations are developed mostly by the employers with no known input from the employees (Pettijohn, Parker and Pettijohn, 2001). Additionally, the employee awards are heavily dependent upon the PAS and it is

mostly an annual affair (Zhang, Shum and Belarmino, 2023). Hence the drawbacks for PAS are also applicable for the existing employee awards process.

In order to address these drawbacks, R&R should be offered in an ongoing and continuous manner. Although the importance and the positive correlation between R&R and employee performance has been established (Luthans, 2000; Bradler *et al.*, 2016), it has not known to be widely practiced in organizations. An initial step in this regard would be to build a set of well-defined criteria that are acceptable to both employees and employers. Hence the objective of this study is to identify the set of criteria with respect to both employees' and employers' perspectives.

The scope of this research is limited to Information Technology (IT) organizations due to the alarming rate of attrition (Pallathadka *et al.*, 2022) and the presence of younger population (Gen Y and Gen Z) who are knowledge workers (Shujahat *et al.*, 2019). They expect frequent appreciation and continuous feedback regarding their performance (Arora and Dhole, 2019). In this research, employees are represented by Software Engineers and the employers are represented by Project Managers.

2. Method

As the employees cherish getting recognized not only for their contributions but also for their efforts, it is important to understand their expectations. This can be sequentially explored. Exploratory sequential method has two cascading phases (Ivankova, Creswell and Stick, 2006; Creswell, 2014). In the first phase a qualitative approach is followed, and in the second phase, a quantitative approach. The results obtained during the qualitative phase becomes the input for quantitative phase. Accordingly, this research was broadly divided into two phases: Phase I is the qualitative process of identifying the criteria, both from employees and employers' perspectives; and Phase II is about further exploring the importance of the criteria from a large set of respondents using survey method. An overview of the exploratory sequential method is illustrated in Figure 1.

2.1 Phase I: Qualitative

With only a broad idea in mind, the objective in this phase was to gather as much information as possible in form of vignettes, experiences and expectations that the employees have in terms of *what would they like to be recognised for*. The question was straightforward: What did they (the employees) think the employers should consider rewarding and recognizing them. At the end of this phase, a set of criteria should be identified which is consensual to both employees and employers. For this a three stage approach was developed. Stage 1 and 2 were interviews with employees to identify the criteria, along with content analysis and triangulation and Stage 3 was to corroborate these results with the employers. These stages are explained in detail.

2.1.1 Stage 1: Unstructured Interview

An unstructured interview (Zhang and Wildemuth, 2009; Chauhan, 2022) with the employees was carried out to explore and understand their opinions regarding the criteria that they expect to be used for evaluating their performance. The respondents were recruited strictly based on the inclusion criteria that the software engineer should have completed at least one appraisal cycle and have undergone a traditional performance appraisal process. This is important because the respondent could explain the expectations in a realistic manner. The respondents were briefed about the purpose of the interview, that their identity would remain confidential and that they can withdraw from the interview at any point of time. Only one withdrawal happened due to a personal emergency. The interviews were conducted at a neutral location such as cafeteria or a common atrium. Each interview lasted on an average for about 45 minutes, with the shortest completed one at 28 minutes. Initially 12 software engineers from three different organizations were identified for the interview. Information saturation was reached at about the ninth interview. Nevertheless, 11 interviews were completed.

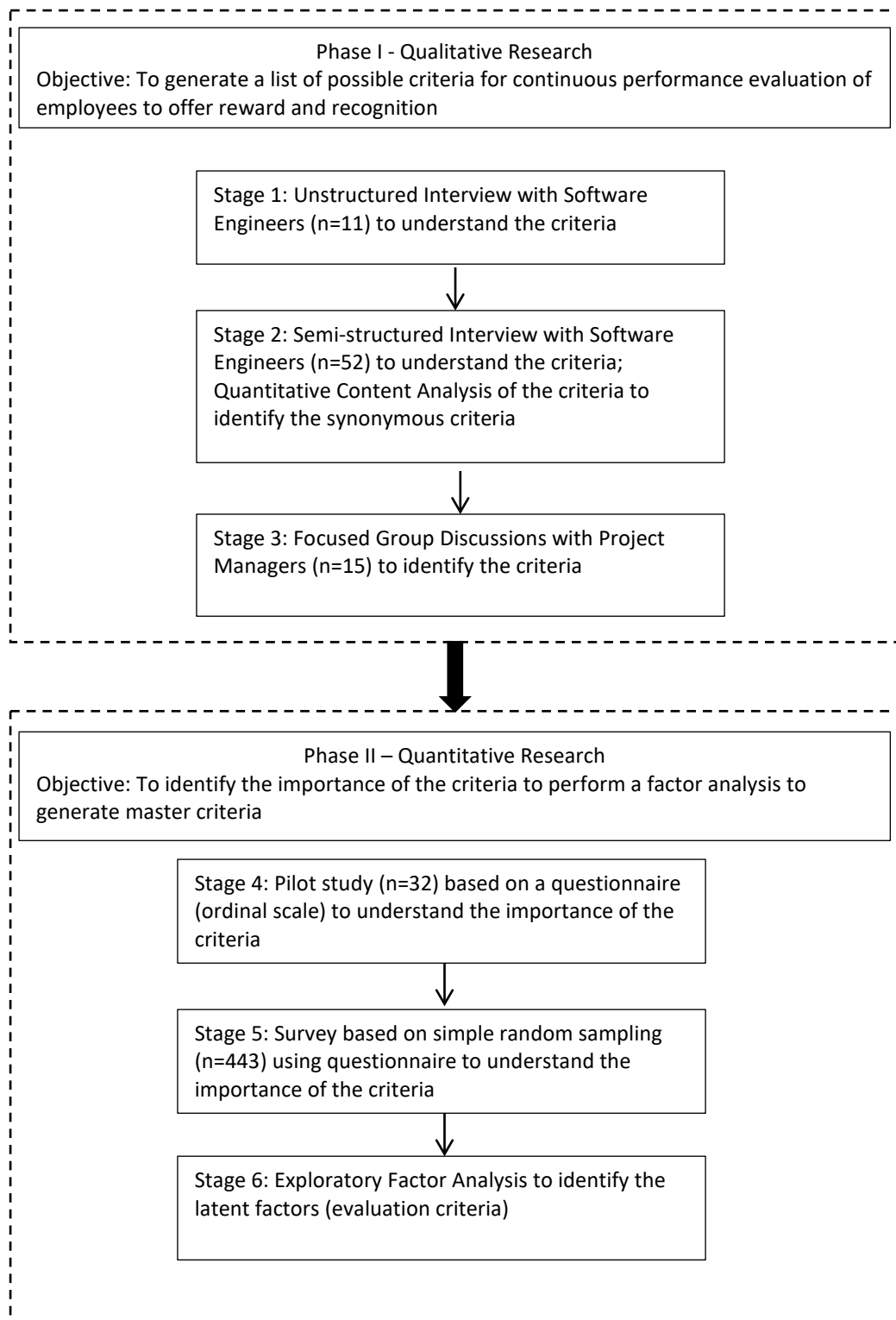


Figure 1: Illustration of the exploratory sequential process followed in this paper

The transcripts of these interviews were carefully read and a quantitative content analysis was performed on each of them. The objective of the content analysis was to identify terms or phrases that can be considered as a possible criterion for continuous performance evaluation. Synonymous words and phrases were grouped together. Thus a set of 31 unique criteria were identified from all the 11 interviews.

2.1.2 Stage 2: Semi-structured Interview

For a better understanding regarding the sufficiency of these criteria, another round of semi structured interview was conducted among 52 software engineers. These participants were not part of Stage 1. The participants were given the list of identified criteria and were asked to include or remove any more criteria as they find important. Out of the 31 criteria, none of them were removed, but two more criteria were added.

Criteria from these two stages were then triangulated with the criteria available from literature. Although there were no specific criteria available in the literature for continuous performance evaluation, the generic set of criteria used to evaluate software engineers were identified. Synonymous criteria (for eg. 'ability to reiterate the client requirements' and 'seeking for clarification from clients on the requirement' were mapped to *Customer Interaction*). The triangulation resulted in correctly mapping about 83% of the criteria identified until stage 2. The coding was also conducted by another independent researcher from the linguistic area to ascertain the mapping accuracy. A satisfactory inter-rater reliability (Hayes and Krippendorff, 2007) was obtained (Krippendorff's $\alpha = 0.822$). This indicated that the set of criteria identified from the literature and the interviews have sufficient coherence.

While the employees offer their wish list of criteria, for all practical reasons, it has to be validated from an administration perspective. For this purpose, a round of focused group discussion was arranged with the employers.

2.1.3 Stage 3: Focus Group Discussion

In Stage 3, the criteria identified until stage 2 was validated by a group of managers who would use these criteria to evaluate their employees. Hence for an all-round perspective the managers' viewpoints are also mandatory to be incorporated. Two rounds of focus group discussions were conducted with seven and eight managers respectively. The anchor point of the discussion revolved around the criteria. As the objective is validation, they were asked about the identified criteria and sought its importance for continuous performance evaluation. In the discussion that lasted on an average 34 minutes, the managers upheld 21 of the 33 criteria, eliminated 11 criteria and inserted 7 more thus making it to 28 criteria.

The list of criteria in each stages is listed in Table 1. At the end of Phase I, a comprehensive set of 28 criteria were identified. This necessitated further exploration with respect to the perceived importance of each of these criteria. Hence a large scale survey research was designed.

2.2 Phase II: Quantitative

In Phase II, the criteria identified in Phase I was developed into a questionnaire with a 5-point Likert scale. The demographics of the respondents were also sought, and questions such as "How important do you think *timeline adherence* as a criteria for evaluating your performance" were asked for each criteria.

2.2.1 Stage 4: Pilot Test

In Stage 4, a pilot test of the questionnaire was done for the following objectives: to check for content and construct validity, reliability, time taken to complete the questionnaire and to seek any more criteria that were initially left out (open ended questions). The pilot study was done among 32 randomly identified employees. The content validity was established as there were no additional questions that were asked to be included. Certain questions were reworded slightly so as to better convey the intended meaning. Due to the difficulty in conducting a test-retest method, the reliability of the questionnaire was established using statistical measure (Cronbach's $\alpha = 0.786$). The respondents took an average 12 minutes to complete the questionnaire. As the instrument contained sufficient validity and reliability, it was sent to a larger set of respondents.

2.2.2 Stage 5: Survey Method

Using simple random sampling among the population, the questionnaire was sent through an online survey platform. Out of the 1322 questionnaires sent, 498 respondents completed the questionnaire (response rate: 37.6%). Among these only 443 were complete in all respects, and hence the final analysis was performed on the 443 responses.

Table 1. List of criteria for CPEE identified from each stages of Phase I

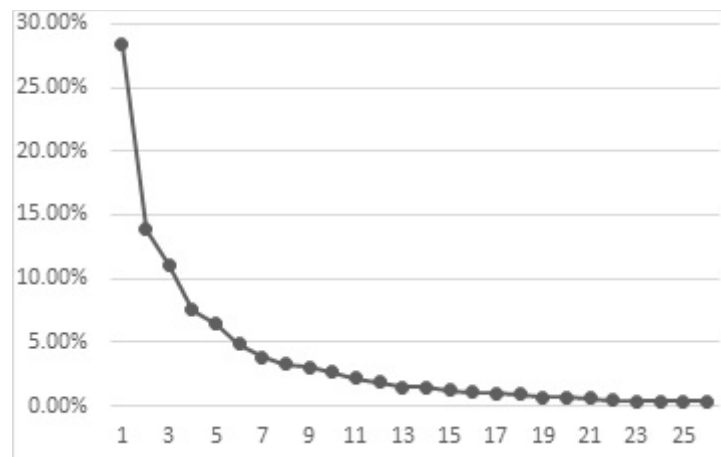
SI No	Criteria	Stage 1	Stage 2	Literature	Stage 3
1	Quantity of Work	✓	✓	✓	
2	Timeline adherence	✓	✓	✓	✓
3	Customer interaction	✓	✓	✓	✓
4	Target achievement	✓	✓	✓	✓
5	Timely Reporting	✓	✓	✓	✓
6	Documentation	✓	✓	✓	✓
7	Reviewing				✓
8	Analytical Ability	✓	✓	✓	✓
9	Work planning			✓	
10	Creativity		✓	✓	✓
11	Communication skills	✓	✓	✓	✓
12	Knowledge updation	✓	✓	✓	✓
13	Initiative	✓	✓	✓	✓
14	Understanding big-picture				✓
15	Additional Responsibilities	✓	✓	✓	✓
16	Presentation skills	✓	✓	✓	✓
17	Negotiation skills		✓	✓	✓
18	Ideas / Suggestions	✓	✓	✓	✓
19	Innovation			✓	
20	Patents / Publications			✓	
21	Self-learning	✓	✓	✓	✓
22	Leadership			✓	✓
23	Team Cooperation	✓	✓	✓	✓
24	Punctuality	✓	✓	✓	✓
25	Mentoring			✓	✓
26	Perseverance	✓	✓	✓	
27	Humor Sense	✓	✓	✓	
28	Critical Thinking	✓	✓	✓	
29	Passion	✓	✓	✓	
30	Resilience	✓	✓	✓	
31	Commitment	✓	✓	✓	✓
32	Knowledge sharing	✓	✓	✓	✓
33	Proactiveness	✓	✓	✓	
34	Code of Conduct				✓
35	Social Volunteering	✓	✓	✓	✓
36	Agility	✓	✓	✓	
37	Corporate Social Responsibility			✓	
38	Business domain knowledge	✓	✓	✓	
39	Multi-tasking	✓	✓	✓	
40	Improving morale				✓
41	Quality of the job	✓	✓	✓	✓
42	Process Adherence	✓	✓	✓	
43	Cost saving			✓	
44	Co-curricular activities	✓	✓	✓	
45	Best Practice				✓
Number of criteria in each stage		31	33	40	28

2.2.3 Stage 6: Factor Analysis

To identify the latent structure of the 28 criteria, an exploratory factor analysis (EFA) was performed on the responses using maximum likelihood method. As an initial step before factor analysis, Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) test and Bartlett's test were conducted on the data. As a general practice, only those criteria with KMO value greater than 0.5 are acceptable (Nunnally and Bernstein, 1994). Two criteria (*Best Practice* and *Code of Conduct*) were removed due to low KMO value, and the resultant overall KMO was found to be 0.7201. Bartlett's test of sphericity is conducted on the data set with 26 criteria to examine homogeneity of variance and was found acceptable (Bartlett's test $\chi^2=649.28$; $df=25$; p value <0.05). This indicated that the data set was factorable. The EFA resulted in indicating the latent structure among these 26 criteria, identified using eigen value (Table 2) and scree plot (Figure 2)

Table 2. Eigen values and percentage of variance explained by the number of factors (first 10)

No	Eigen Value	% Variance	Cumulative %
1	7.375428	28.37%	28.37%
2	3.599614	13.84%	42.21%
3	2.890953	11.12%	53.33%
4	1.963142	7.55%	60.88%
5	1.679835	6.46%	67.34%
6	1.269327	4.88%	72.22%
7	0.998493	3.84%	76.06%
8	0.854821	3.29%	79.35%
9	0.785312	3.02%	82.37%
10	0.685383	2.64%	85.01%
11

**Figure 2: Scree Plot indicating the number of factors to be extracted from 26 criteria**

From Figure 2, it can be noticed that there are four major bends, indicating that at least four factors can be extracted from the criteria present in the data set. However, the exact number of criteria cannot be completely visualized from the scree plot. The number of factors can be decided from the eigen values in Table 2. The number of factors can be as many as the number of rows of eigen values with more than 1 (Crawford *et al.*, 2010; Ahn and Horenstein, 2013).

3. Results and Discussion

From Table 2 the first six rows include eigen values which are greater than 1, indicating that there are six factors which can be extracted. These values cumulatively explain more than 70% of the variance. The factor loading for all criteria obtained after *oblimin* rotation are grouped and shown in Table 3. Factor loadings less than 0.45 are not considered and those above 0.45 are listed under the corresponding factor (considered as main criteria) as shown in Table 4.

Table 3. Grouped factor loadings based on Exploratory Factor Analysis

Criteria	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Com	S. Var.
Quality of the job	0.700						0.706	0.293
Documentation	0.836						0.828	0.172
Analytical ability	0.467						0.686	0.314
Reviewing	0.531						0.539	0.460

Criteria	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Com	S. Var.
Presentation	0.868						0.818	0.182
Customer interaction		0.516					0.592	0.407
Communication		0.705					0.749	0.250
Negotiation		0.654					0.625	0.374
Knowledge updation			0.821				0.757	0.242
Initiative			0.745				0.810	0.189
Self-learning			0.657				0.744	0.255
Leadership			0.614				0.611	0.388
Timeline adherence				0.710			0.679	0.320
Timely reporting				0.722			0.786	0.213
Process adherence				0.585			0.568	0.431
Punctuality				0.818			0.798	0.201
Understanding big picture					0.455		0.645	0.354
Ideas and suggestions					0.695		0.728	0.271
Creativity					0.796		0.881	0.118
Cost saving					0.831		0.746	0.253
Additional responsibility						0.914	0.858	0.141
Knowledge sharing						0.617	0.759	0.241
Commitment						0.539	0.725	0.274
Improving morale						0.492	0.598	0.401
Team work						0.679	0.812	0.187
Mentoring						0.729	0.608	0.391

Table 4: Major Criteria (Factors) for CPEE to offer R&R and corresponding sub-criteria

Factor 1: Diagnostic	Factor 2: Dynamic	Factor 3: Proactive	Factor 4: Prompt	Factor 5: Resourceful	Factor 6: Responsible
Quality of the job	Customer Interaction	Knowledge updation	Timeline adherence	Understanding Big Picture	Additional Responsibilities
Documentation	Communication	Initiative	Timely reporting	Ideas and Suggestions	Knowledge sharing
Analytical ability	Negotiation	Self-learning	Process adherence	Creativity	Commitment
Reviewing	---	Leadership	Punctuality	Cost Saving	Teamwork
Presentation	---	---	---	---	Mentoring
---	---	---	---	---	Improving morale

As indicated in Table 4, the identified factors were named as: *Diagnostic, Dynamic Proactive, Prompt, Resourceful and Responsible*. The latent coherence among each of the corresponding sub-criteria among the main criteria can be used to evaluate employees to offer R&R. The identified six factors (main criteria) would have sufficient external validity, given its generic nature.

The success of the CPEE process lies in its continuity. Using the main criteria and sub-criteria identified, a multi-criteria decision making method can be employed to develop a well-structured process to make the evaluation happen in a continuous manner. Often managers are not really aware of the process of R&R and are equally clueless about the evaluation criteria, that discourages them from practicing it (Nelson, 2001). This study offers an initial understanding of the set of criteria for CPEE to offer R&R. The specific set of sub-criteria may vary for different industries, however the main criteria identified would stay relatively common.

The identified criteria for CPEE is not to be considered as a replacement for the organizations existing PAS, but instead it could be used as complementary. A timely feedback favourably increases the employees' justice perception (Singh, 2018). A robust and well-designed CPEE based on these identified criteria could offer objective and periodic assessment, offering a real time feedback to employees with regard to their performance (Heller, 2017). This could eliminate or reduce the errors due to the over dependency in PAS, and ensures transparency and fairness in evaluations. As it generates objective information periodically, the output from a

CPEE model can be used to model and predict employee performance (Alsobaey and Al-Alawi, 2023) and can enable better appraisal design (Wang, 2022).

4. Conclusion

The paper details an exploratory sequential mixed methods research to identify criteria for continuous performance evaluation of employees, specifically aimed at offering rewards and recognition. The study was conducted in two broad phases. In Phase I, a qualitative method was followed in three stages: unstructured and semi-structured interviews and a focus group discussion. A quantitative content analysis method was used for data analysis and a triangulation was also performed to ascertain the veracity and sufficiency of information. In Phase II a large scale quantitative method was followed in three stages. A questionnaire based survey was carried out using a pilot study and a main study, and latent factors were extracted based on exploratory factor analysis. Finally, six major criteria were identified for the continuous performance evaluation of employees: Diagnostic, Dynamic, Proactive, Prompt, Resourceful and Responsible. The study has major limitations such as concentrated only on the IT industry, relatively small sample size and lack of confirmation or validation of the identified factors. Developing a process for evaluation using the identified criteria could be a possible future direction in this area. Also the veracity of these criteria could also be verified in other industries.

References

- Ahn, S.C. and Horenstein, A.R. (2013) 'Eigenvalue ratio test for the number of factors', *Econometrica*, 81(3), pp. 1203–1227.
- Alsobaey, T.M. and Al-Alawi, A.I. (2023) 'The Use of Data Mining Techniques to Predict Employee Performance: A Literature Review', in: 2023 International Conference On Cyber Management And Engineering (CyMaEn), IEEE, pp. 158–163.
- Arora, N. and Dhole, V. (2019) 'Generation Y: Perspective, engagement, expectations, preferences and satisfactions from workplace; a study conducted in Indian context', *Benchmarking: An International Journal*, 26(5), pp. 1378–1404.
- Balakrishnan, S.R., Soundararajan, V. and Parayitam, S. (2022) 'Recognition and rewards as moderators in the relationships between antecedents and performance of women teachers: evidence from India', *International Journal of Educational Management [Preprint]*, (ahead-of-print).
- Boice, D.F. and Kleiner, B.H. (1997) 'Designing effective performance appraisal systems', *Work study*, 46(6), pp. 197–201.
- Bradler, C. et al. (2016) 'Employee recognition and performance: A field experiment', *Management Science*, 62(11), pp. 3085–3099.
- Chauhan, R.S. (2022) 'Unstructured interviews: are they really all that bad?', *Human Resource Development International*, 25(4), pp. 474–487.
- Crawford, A.V. et al. (2010) 'Evaluation of parallel analysis methods for determining the number of factors', *Educational and Psychological Measurement*, 70(6), pp. 885–901.
- Creswell, J.W. (2014) *A concise introduction to mixed methods research*. SAGE publications.
- Guerra-López, I. and Hutchinson, A. (2013) 'Measurable and continuous performance improvement: The development of a performance measurement, management, and improvement system', *Performance Improvement Quarterly*, 26(2), pp. 159–173.
- Hansen, F., Smith, M. and Hansen, R.B. (2002) 'Rewards and recognition in employee motivation', *Compensation & Benefits Review*, 34(5), pp. 64–72.
- Hayes, A.F. and Krippendorff, K. (2007) 'Answering the call for a standard reliability measure for coding data', *Communication methods and measures*, 1(1), pp. 77–89.
- Heller, M. (2017) 'Real-time, ongoing employee feedback: The perk that actually retains', *Strategic HR Review [Preprint]*.
- Ivankova, N.V., Creswell, J.W. and Stick, S.L. (2006) 'Using mixed-methods sequential explanatory design: From theory to practice', *Field methods*, 18(1), pp. 3–20.
- London, C. and Higgot, K. (1997) 'An employee reward and recognition process', *The TQM Magazine*, 9(5), pp. 328–335.
- Lunenburg, F.C. (2012) 'Performance appraisal: Methods and rating errors', *International journal of scholarly academic intellectual diversity*, 14(1), pp. 1–9.
- Luthans, K. (2000) 'Recognition: A powerful, but often overlooked, leadership tool to improve employee performance', *Journal of Leadership Studies*, 7(1), pp. 31–39.
- Nelson, B. (2000) 'Are performance appraisals obsolete?', *Compensation & benefits review*, 32(3), pp. 39–42.
- Nelson, R.B. (2001) 'Factors that encourage or inhibit the use of non-monetary recognition by United States managers'.
- Niven, P.R. and Lamorte, B. (2016) *Objectives and key results: Driving focus, alignment, and engagement with OKRs*. John Wiley & Sons.
- Nunnally, J.C. and Bernstein, I.H. (1994) *Psychometric Theory*. New York: McGraw-Hill.
- Pallathadka, H. et al. (2022) 'Attrition in software companies: Reason and measures', *Materials Today: Proceedings*, 51, pp. 528–531.
- Pettijohn, L.S., Parker, R.S. and Pettijohn, C.E. (2001) 'Performance appraisals: usage, criteria and observations', *Journal of Management Development [Preprint]*.
- Pichler, S. (2012) 'The social context of performance appraisal and appraisal reactions: A meta-analysis', *Human Resource Management*, 51(5), pp. 709–732.

- Sahai, S. and Srivastava, A. (2012) 'Goal/target setting and performance assessment as tool for talent management', *Procedia-Social and Behavioral Sciences*, 37, pp. 241–246.
- Schraeder, M., Becton, J.B. and Portis, R. (2007) 'A Critical Examination of Performance Appraisals: An Organization's Friend or Foe?', *The journal for quality and participation*, 30(1), p. 20.
- Shujahat, M. et al. (2019) 'Translating the impact of knowledge management processes into knowledge-based innovation: The neglected and mediating role of knowledge-worker productivity', *Journal of Business Research*, 94, pp. 442–450.
- Singh, A. (2018) 'Continuous performance-based feedback and justice perceptions: Evidence for mediation by experienced participation', *IIMB management review*, 30(2), pp. 134–139.
- Sreejith, S. (2015) 'The X factor that can help to motivate Generation Y: Performance evaluation in IT needs to move from the manufacturing model', *Human resource management international digest*, 23(1), pp. 32–34.
- Wang, J. (2022) 'Innovation of employee performance appraisal model based on data mining', in. *International Conference on Cognitive based Information Processing and Applications (CIPA 2021) Volume 1*, Springer, pp. 410–419.
- Zhang, Y. and Wildemuth, B.M. (2009) 'Unstructured interviews', *Applications of social research methods to questions in information and library science*, pp. 222–231.
- Zhang, Y., Shum, C. and Belarmino, A., (2022). "Best Employers": The Impacts of Employee Reviews and Employer Awards on Job Seekers' Application Intentions. *Cornell Hospitality Quarterly*, 64(3), pp 298-306

Development of a Design Science Artefact to Teach Computing Students: A Systematic Literature Review

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Abstract: Teaching students to conduct a rigorous systematic literature review (SLR) may be challenging, given the growing output of scientific literature and the increasing plethora of supporting software and artificial intelligence tools such as ChatGPT. A SLR supported by design science artefacts and emerging artificial intelligence tools have the potential to overcome the challenges posed by increasing scientific literature. However, guidelines and steps required to conduct a SLR still need to be clarified in the existing literature. Furthermore, existing design science artefacts and software tools do not support teaching students to conduct rigorous systematic reviews. This paper presents guidelines on the required steps for a rigorous SLR and proposes a Researchbuddie artefact to support teaching SLR. Using a systematic review and design science findings, identify SLRs four main phases of planning, conducting, evaluating and reporting reviews, each supported by itemised sub-steps. Furthermore, a design science artefact Researchbuddie is proposed to support teaching SLR. Therefore, the paper contributes to guidelines for teaching SLR for Information Systems students with phases, sub-steps and a proposed Researchbuddie artefact.

Keywords: Systematic literature review, design science research, information systems, artefact, teaching SLR

1. Introduction

Teaching postgraduate students to conduct rigorous systematic literature reviews (SLRs) may be challenging, even more so given the growing output of scientific literature (Denzler et al, 2021) and the ever-increasing plethora of software and artificial intelligence tools such as ChatGPT. According to Kitchenham and Charters (2007), the original impetus for Systematic literature review (SLR) was to support evidence-based medicine, and many guidelines reflect this viewpoint. The SLR that emerged as an evidence-based medical movement has spread to social science research (Boell & Cecez-Kecmanovic, 2015). Additionally, the popularity of SLRs in various fields challenges the need for discipline-specific methods, especially for Information Systems (IS) students. The broad nature of IS research suggests varied approaches to research and research subject matter. Rigorous systematic literature searches are often complex, error-prone and time-consuming, requiring adequate technological assistance (Sturm & Sunyaev, 2019).

There is a growing consensus that reviewing literature can be an overwhelming task (Bandara et al, 2015), time-consuming and error-prone (Marshall & Brereton, 2013), with Jennex (2015), an editor-in-chief in one of the top Information journals alluding to the declining quality of literature reviews in papers submitted. Consequently, Stefanovic et al (2021) indicate that, in recent years, software tools and artefacts have been designed to enhance the efficiency, accuracy, and ease of the literature review process by reducing time, increasing the quality of assessment, minimising researcher subjectivity, and simplifying the review. However, software tools and artefacts to aid in the SLR process have yet to be discussed in a consolidated way (Bandara et al, 2015). Moreover, in contrast to Bai et al (2019), we found that there needs to be more homogeneity regarding the number of steps used in the exemplary literature on guidelines for conducting SLRs in IS research. Furthermore, in some of the papers, the sequence of the steps may need to be clarified. For example, Okoli (2015) applied practical screening before the literature search, and Marshall and Brereton (2013) placed protocol development before identifying the research. Previous studies that have examined the use of tools to support SLRs include Marshall and Brereton (2013), who identify and classify tools that can help to automate parts or all of the SLR process, and Stefanovic et al (2021) evaluated three tools to support a SLR using the DESMET methodology. Moreover, Sundaram and Berleant (2023) identified the objectives of the SLR automation studies and aspects of systematic literature steps that were automated. However, these studies do not explore the potential of the artefacts and tools in supporting the teaching of SLR nor do provide a detailed discussion of the steps, including the tasks to be completed at each step. In the SLR, design science may support conducting a rigorous SLR as design artefacts may generate knowledge of how things can and should be constructed or arranged by using creative and innovative solutions to problems, building on existing

parts of a solution, combining revisions, and extending actual design knowledge (vom Brocke et al, 2020). Moreover, artefacts are used when designing, developing, implementing, maintaining, and using IS and software systems (Wieringa, 2014). To address the gap relating to artefacts to teach SLR, the main research question is: What design science research artefacts and tools support teaching various steps in a SLR in IS research? The following sub-research-questions support the main research question:

1. What are the SLR steps used in IS research?
2. What SLR tools and artefacts support each SLR step conducted in IS research?
3. How can design science research artefacts adapt existing tools to support teaching SLR to postgraduate students?

In answering the research questions, the paper builds on the research of scholars such as Benke et al (2020), Berkemeier et al (2019), Goeken and Patas (2010), Niemoller et al (2019), Simmert et al (2019), Stefanovic et al (2021), and Sturm and Sunyaez (2019), who have applied design science research to develop solutions to real-world problems. In addition, the paper draws from prior work on guidelines to conduct SLRs, such as Okoli (2015) and Bai et al (2019).

2. Methodology

There are several methodologies that one may adopt in the design of design science artefacts. According to Siemon et al (2022), various methods, including systematic reviews, interviews, and experiments, may be used in design science research to ensure that design science knowledge is comprehensible. In this paper, we sequentially adopted a SLR and design science. The AIS library was identified as a viable source as the platform where Senior Scholars Information Systems publish. Using search phrases that included “SLR”, and “tools,” and “SLR”, and “design science,” the search was conducted. The search was further filtered for journal articles, which were extracted based on the filter. The initial search generated 2 775 results, and filtering for journal articles resulted in 221 results, resulting in a dataset of 11 papers selected for analysis. These were augmented to 16 articles and one technical report from snowballing for highly influential papers from those identified in the initial data depicted in Table 1.

In analysing the selected articles, an inductive approach was adopted, and the SLR search for artefacts and tools was augmented with a search of five tools assessed for potential to support the various SLR steps. The assessment is attached as Appendix 1. In the second phase, the SLR and assessment results informed the design of science research to develop the Researchbuddie artefact. March and Storey (2008) suggest that design science research contribution requires the identification, description, and solution of a relevant organisational IT problem, supported by the development of a novel IT artefact. Furthermore, Hevner et al (2004) indicate that design science intends to create and evaluate IT artefacts to solve identified organisational problems.

Table 1: Primary papers

#	Year of publication	Authors	Articles	Journals	Google Scholar citations
1	2022	Sundaram, G. and Berleant, D.	Automating SLRs with natural language processing and text mining a SLR	Eighth Int. Congress on Information and Communication Technology	0
2	2021	Stefanovic, D., Havzi, S., Nikolic, D., Dakic, D., & Lolic, T.	Analysis of the tools to support SLR in software engineering	IOP Conference Series: Materials Science and Engineering	4
3	2020	Benke, I., Feine, J., Venable, J. R., & Maedche, A.	On implementing ethical principles in design science research	AIS Transactions on Human - Computer Interaction	11
4	2019	Bai, Z., Jain, N., Kurdyukov, R., Walton, J., Wang, Y., Bentley Wasson, T. and Zhu, X.	Conducting SLRs in Information Systems: An Analysis of Guidelines	Issues in Information Systems	9
5	2019	Berkemeier, L., Zobel, B., Werning, S., Ickerott, I. and Thomas, O.	Engineering of augmented reality-based information systems design and implementation for intralogistics services	Business & Information Systems Engineering	62
6	2019	Niemoller, C., Metzger, D., Berkemeier, L. and Zobel, B.	Mobile service support based on smart glasses	Journal of Information Technology Theory and Application	8

#	Year of publication	Authors	Articles	Journals	Google Scholar citations
7	2019	Simmert, B., Ebel, P.A., Peters, C. and Bittner, E.A.C.	Conquering the challenge of continuous business model improvement	Business & Information Systems Engineering	24
8	2019	Simonofski, A., Serral Asensio, E. and De Smedt, J.	Hearing the voice of citizens in smart city design: the CitiVoice framework	Business & Information Systems Engineering	70
9	2019	Sturm, B. and Sunyaev, A.	Design principles for systematic search systems: a holistic synthesis of a rigorous multi-cycle design science research journey	Business & Information Systems Engineering	38
10	2019	Morana, S., Kroenung, J., Maedche, A. and Schacht, S.	Designing process guidance systems	Journal of the Association for Information Systems,	20
11	2015	Okoli, C.	A guide to conducting a standalone SLR	Communications of the Association for information Systems	963
12	2015	Boell, S. K., & Cecez-Kecmanovic, D	On being 'systematic' in literature reviews in IS	Journal of Information Technology	566
13	2015	Bandara, W., Furtmueller, E., Gorbacheva, E., Miskon, S. and Beekhuyzen, J.	Achieving rigor in literature reviews: Insights from qualitative data analysis and tools-support	Communications of the Association for information Systems	337
14	2014	Fink, A.	Conducting a SLR from internet to paper	Book	4576
15	2013	Marshall C. and Brereton, P.	Tools to support SLRs in software engineering: A mapping study	ACM / IEEE International Symposium on Empirical Software Engineering and Measurement	118
16	2010	Goeken, M. and Patas, J.	Evidence-based structuring and evaluation of empirical research in requirements engineering fundamentals, framework, research map	Business & Information Systems Engineering	23

3. Findings and discussion

A meta-analysis revealed 13 main steps spread across the various papers, and the most homogeneous step was the selection of studies, followed by the database search step and the search string development step. The steps that had the highest level of heterogeneity and appeared in fewer papers were evaluating the review protocol, specifying the dissemination mechanism and evaluating the SLR report. Despite the evaluation protocol's heterogeneity, it is a critical step in supporting teaching SLR as it could support individual student checks, peer reviews and assessments by the educator. The meta-analysis results are depicted in Figure 1.

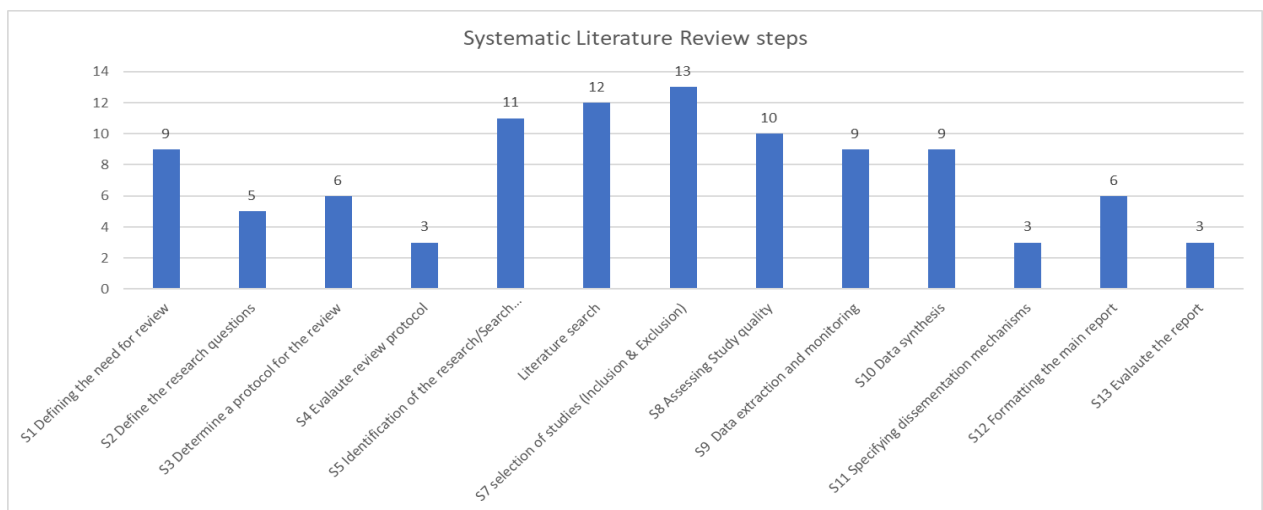


Figure 1: Meta-Analysis SLR steps

The meta-analysis was followed by a descriptive analysis, guided by Kitchenham and Charters (2007), to gain deeper insights into the steps to provide depth of tasks in each step. Therefore, potential guidelines to facilitate teaching and learning in a SLR were developed. Based on the findings, SLR steps allude to 13 steps that may be categorised into four phases: planning, conducting, reporting (Kitchenham & Charters, 2007) and evaluating the SLR. These four phases are illustrated in Figure 2 and discussed in the subsequent sections.



Figure 2: SLR phases

3.1 Planning phase

The planning phase of the SLR process involves four main steps: defining the need for review, formulating a research question, and establishing and evaluating the review protocol. Defining the need for review, also referred as problem definition, involves identifying the purpose and goals of the review and ensuring clarity for readers (Bai et al, 2019; Benke et al, Kitchenham & Charters, 2007; Marshall & Brereton, 2013; Morana et al, 2019; Okoli, 2015; Stefanovic et al, 2021; Sundaram & Berleant, 2023). Furthermore, Kitchenham and Charters (2007) indicate that the need for a systematic review arises from the requirement to summarise all existing information about some phenomenon thoroughly and unbiasedly or as a prelude to further research activities and includes evaluating existing reviews against set criteria. Following the identification step, research questions are formulated (Fink, 2014; Goeken & Patas, 2010; Kitchenham & Charters, 2007; Sundaram & Berleant, 2023) with a question precisely stated to guide the review (Fink, 2014). According to Kitchenham and Charters (2007), individual population intervention, comparison, and outcome (PICO) facets can help refine the research question.

The research question definition precedes the protocol determination, development or establishment step (Bai et al, 2019; Fink, 2014; Kitchenham & Charters, 2007; Marshall & Brereton, 2013; Okoli, 2015; Stefanovic et al, 2021; Sundaram & Berleant, 2023). The protocol outlines how each step in the SLR will be executed, including tasks in the planning phase (Kitchenham & Charters, 2007). Furthermore, Okoli (2015) highlights the importance of a protocol, especially in reviews involving multiple reviewers, to ensure consistency in the review process. After developing the protocol, the next step is protocol evaluation or validation (Kitchenham & Charters, 2007; Stefanovic et al, 2021; Sundaram & Berleant, 2023). Furthermore, Kitchenham and Charters (2007) indicate that evaluating the protocol is crucial and should involve study supervisors to enable the assessment of critical aspects such as search strings being appropriately derived from research questions, the potential of the data to be extracted to address research questions adequately and ensuring the data analysis procedures' appropriateness to answer the research question.

3.2 Conducting phase

Conducting the review phase is the most engaging part of the process and consists of six steps: search string development, literature search, study selection, assessment of study quality, data extraction, and synthesis. The initial step in conducting the review is one of the homogeneous steps in most papers; others refer to it as choosing, defining, developing, and generating search strings (Benke et al, 2020; Fink, 2014; Goeken & Patas, 2010; Niemoller et al, 2019; Simonofski et al, 2019; Sundaram & Berleant, 2023) or keyword identification, search query creation (Morana et al, 2017) and search strategy (Kitchenham & Charters, 2007). Search string development involves using the research question to identify keywords and create search queries or strings (Goeken & Patas, 2010). Moreover, in formulating search strings, the keyword synonyms are often used (Benke et al, 2020), along with Boolean operators such as 'AND' and 'OR'.

The literature search step is referred to define, identify, establish, and determine databases (Benke et al, 2020; Fink, 2014; Goeken & Patas, 2010; Morana et al, 2017; Simmert et al, 2019; Sturm & Sunyaev, 2019). It is also called search database (Berkemeier et al, 2019), search literature (Bai et al, 2019; Kitchenham & Charters, 2007; Okoli, 2015) or extract literature (Bandara et al, 2015). It entails defining the databases to be searched and extracting articles from the identified sources (Goeken & Patas, 2010), explicitly describing the details of the literature search and justifying the comprehensiveness of the search (Okoli, 2015). In the field of IS, popular databases for searches include EBSCOhost, AIS Electronic Library (Morana et al, 2017; Niemoller et al, 2019), ScienceDirect, ISI Web of Knowledge, Springerlink, Emerald, Wiley Online Library (Niemoller et al, 2019) and ProQuest, ACM Digital Library and IEEE Xplore Digital Library (Morana et al, 2017), and backwards and forward searches, also known as snowballing, may be used to supplement the database search by including highly influential articles extracted from the databases to ensure comprehensiveness (Morana et al, 2017; Simonofski et al, 2019).

The selection of studies is referred to as practical screening or preselection (Bai et al, 2019; Goeken & Patas, 2010; Kitchenham & Charters, 2007; Okoli, 2015; Stefanovic et al, 2021; Sundaram & Berleant, 2023). The study selection step involves applying practical screening criteria to the articles obtained from the preliminary literature search with the aim to identify relevant articles while excluding irrelevant ones (Fink, 2014). If multiple search strings are used, the screening is applied to identify articles that meet the criteria of both search strings (Benke et al, 2020). Inclusion and exclusion criteria used in study selection should be based on the research question and piloted to ensure studies are correctly classified (Kitchenham & Charters, 2007) with factors such as language (Fink, 2014), article type, journal, authors, setting, participants/subjects, research design, sampling method, and publication date considered (Kitchenham & Charters, 2007). Furthermore, Morana (2017) adds that peer review is also considered in study selection. Furthermore, the inclusion and exclusion criteria need to be justified, articulating how the resulting review may still be comprehensive given the practical exclusion criteria (Okoli, 2015).

Selected studies must be assessed and appraised for quality, the step is also named selection review (Bai et al, 2019; Bandara et al, 2015; Fink, 2014; Goeken & Patas, 2010; Kitchenham & Charters, 2007; Marshall & Brereton, 2013; Okoli 2015, Stefanovic et al, 2021; Sundaram & Berleant, 2023). The quality assessment step explicitly defines the criteria to judge the papers based on methodological quality (Okoli, 2015). For quantitative research, considerations include study design, conduct, analysis, and conclusions, while qualitative research criteria include the credibility of findings, knowledge extension, sample definition, and case selection (Kitchenham & Charters, 2007). In addition, different classification systems can be used to evaluate the studies, such as meta-analysis, narrative reviews, qualitative and quantitative cross-sectional work, case studies, experiments, and expert interviews (Goeken & Patas, 2010).

The data extraction and monitoring step involves systematically extracting bibliometric and descriptive content from each study based on a defined strategy (Bai et al, 2019; Benke et al, 2020; Fink, 2014; Marshall & Brereton, 2013; Morana et al, 2017; Okoli, 2015; Stefanovic et al, 2021; Sundaram & Berleant, 2023). Furthermore, to assure reliability, validity and accuracy, a standardised form is used to record the information accurately; reviewers are trained, the quality of the review is monitored, and the extraction is pilot-tested (Fink, 2014). Moreover, Kitchenham and Charters (2007) suggest that data extraction should be supported with separate forms to accurately record information from primary studies for review questions and study quality criteria. Data synthesis is the last step in conducting the review phase (Bai et al, 2019; Bandara et al, 2015; Fink, 2014; Kitchenham & Charters, 2007; Okoli, 2015; Stefanovic et al, 2021; Sundaram & Berleant, 2023).

Also called data analysis, data synthesis combines the extracted facts using appropriate techniques, such as quantitative, qualitative, or both (Okoli, 2015). The data synthesis step includes coding, analysing, and

summarising evidence from the extracted data (Bai et al, 2019). According to Bandara et al (2015), data synthesis may be divided into organising and preparing for analysis, establishing a pre-coding scheme and coding guidelines, and then conducting the analysis. Different types of synthesis, such as meta-analysis and descriptive analysis, may be used. Meta-analysis may be used to combine results using statistical methods (Fink, 2014) and to reflect the influence of heterogeneity sources on study type, quality, and sample size through tabulation (Kitchenham & Charters, 2007). In contrast, the descriptive analysis provides interpretations based on the reviewers' expertise and the available literature (Fink, 2014) and may integrate natural language results and conclusions through reciprocal translation, using refutational analysis when studies contradict each other, and line argument analysis to identify critical issues in a set of studies (Kitchenham & Charters, 2007).

3.3 Reporting phase

The reporting phase provides a detailed write-up of the results review (Stefanovic et al, 2021). The reporting phase comprises two steps specifying the dissemination mechanism or strategy and formatting the main report (Kitchenham & Charters, 2007; Sundaram & Berleant, 2023). Specifying dissemination mechanism (Sundaram & Berleant, 2023) also referred to dissemination strategy (Kitchenham & Charters, 2007). According to Kitchenham and Charters (2007), dissemination strategy entails planning how results will be distributed, especially for non-academic platforms. Formatting the main report step is informed by the medium in which the review report will be disseminated; for instance, if a journal is targeted, formatting guidelines of the chosen journal will be followed (Kitchenham & Charters, 2007). Of the reviewed papers, it was discovered that the formatting step was only reiterated by Sundaram and Berleant (2023). However, their article does not acknowledge how the step was conducted; this highlights the saliency of specific steps whereby authors perform them without recording them. The saliency was noted in most primary papers using the reporting phase as the last step. Only Bai et al (2019) Bandara et al (2015), Marshall and Brereton (2013), Sundaram and Berleant (2023) and Okoli (2015) have mentioned the reporting process.

3.4 Evaluation phase

Evaluating the report (Kitchenham & Charters, 2007; Sundaram & Berleant, 2023), also called validating the report (Stefanovic et al, 2021), is the last step. Evaluation entails a peer-review process, expert reviews and independent evaluators (Kitchenham & Charters, 2007). Other evaluation tools include the meta-analysis of observational studies in epidemiology (MOOSE) checklist and PRISMA, which originated from the health sciences (Page et al, 2021; Stroup et al, 2000) and evaluation criteria for reviewers stemming from management sciences (Kuckertz & Block, 2021). The categories within the evaluation tools include an introduction (Kuckertz & Block, 2021; Page et al, 2021), background (Stroup et al, 2000), research questions, search strategy, reporting of methods (Kuckertz & Block, 2021; Page et al, 2021; Stroup et al, 2000), result, conclusion and future research (Kuckertz & Block, 2021; Page et al, 2021). The checklist categories are homogeneous. However, there is heterogeneity in the title and abstract, appearing in PRISMA only. The evaluation phase may be necessary to teach SLR, as evaluation is a critical element of the pedagogy. Furthermore, the evaluation phase could include internal and external mechanisms (Kitchenham & Charters, 2007). Based on the SLR results and assessment of existing design science software tools and artefacts, the artefact for teaching SLR was conceptualised.

4. Design science artefact for teaching SLR

In the conceptualisation of the artefact for teaching SLR, Gregor and Jones (2007) specify that any design theory should include as a minimum, purpose and scope, constructs, principles of form and function, artefact mutability, testable propositions, and justificatory knowledge. The purpose of the Researchbuddie artefact is to provide a structured framework and guidance to conduct SLRs in IS as illustrated in are illustrated in Figure 3. The Researchbuddie artefact incorporates essential constructs such as the identified SLR steps at each of the four phases. The artefact follows principles of form and function to ensure usability, including intuitive interfaces, step-by-step guidance, and flexibility for customisation with the steps itemised on the user interface. Its mutability allows users to adapt it to tasks required for each step. Finally, the design includes testable propositions to evaluate the artefact's effectiveness and justificatory knowledge from existing literature review methodologies.

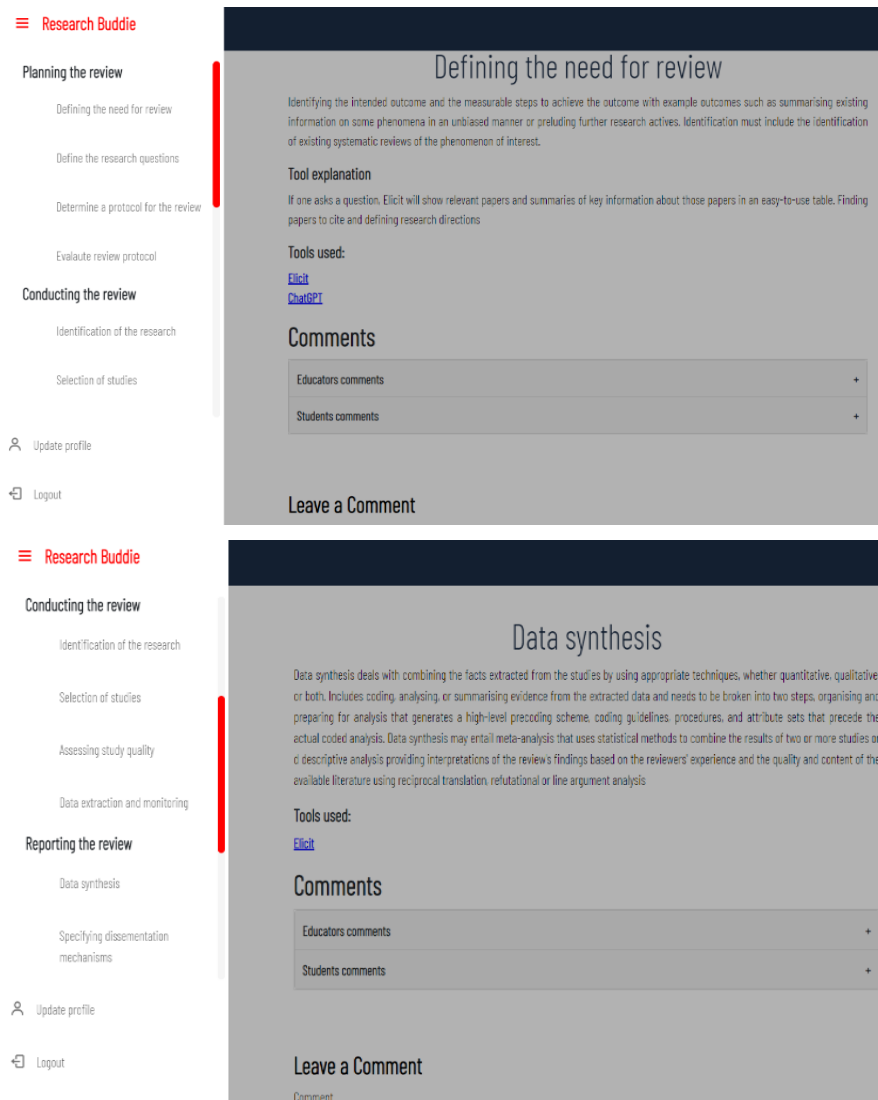


Figure3: Researchbuddie screenshots

5. Conclusions, limitations and future research

This paper examined design science research artefacts and tools that support teaching various steps in a SLR in IS research. Based on a SLR, the primary phase and sub-steps were identified, and guidelines for completing each step's tasks were explained in detail. The identified phases and steps were used as a basis to conceptualise a novel Researchbuddie artefact that may be used to support educators in facilitating a SLR. The designed Researchbuddie artefact may support teaching SLRs, integrating emerging artificial intelligence tools such as ChatGPT, Elicit AI and perplexity to overcome the challenges posed by increasing scientific literature and delivering rigorous SLRs. In addition, the paper may spark debates on the ethical usage of artificial intelligence tools and presents an opportunity for educators and students to share experiences on using artificial intelligence in conducting effective SLRs. However, the study has some limitations. It only focused on the AIS library journal articles. A fundamental limitation is that the proposed Researchbuddie artefact is still to be implemented and evaluated in real-world settings to assess its effectiveness and user acceptance. Future work will focus on implementation and validation with focus group interviews that will include information systems experts with in-depth experience conducting SLRs.

Additionally, the review has uncovered some opportunities for future research that include examining the impact of artificial intelligence tools on digital inequality in student research, as some of the tools bring cost implications. Furthermore, the guidelines for the ethical use of artificial intelligence tools to support a high-quality SLR are required.

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References

- Bai, Z., Jain, N., Kurdyukov, R., Walton, J., Wang, Y., Wasson, T., Zhu, X., and Chircu, A. M. (2019) "Conducting Systematic Literature Reviews in Information Systems: An Analysis of Guidelines", *Issues in Information Systems*, Vol 20, No. 3, pp 83-93.
- Bandara, W., Furtmueller, E., Gorbacheva, E., Miskon, S., and Beekhuizen, J. (2015) "Achieving rigor in literature reviews: Insights from qualitative data analysis and tool-support", *Communications of the Association for Information Systems*, 37(1), pp 54-204.
- Benke, I., Feine, J., Venable, J. R., and Maedche, A. (2020) "On implementing ethical principles in design science research", *AIS Transactions on Human-Computer Interaction*, Vol 12, No. 4, pp 2006-2227.
- Berkemeier, L., Zobel, B., Werning, S., Ickerott, I., and Thomas, O. (2019) "Engineering of augmented reality-based information systems: design and implementation for intralogistics services", *Business & Information Systems Engineering*, Vol 61, pp 67-89.
- Boell, S. K., and Cecez-Kecmanovic, D. (2015) "On being 'systematic' in literature reviews in IS", *Journal of Information Technology*, Vol 30, No 2, pp 161-173.
- Denzler, T., Enders, M. R., and Akello, P. (2021) "Towards a Semi-Automated Approach for Systematic Literature Reviews", Americas Conference on Information Systems (AMCIS), Virtual, August.
- Fink, A. (2014) *Conducting research literature reviews: from the internet to paper*. SAGE.
- Goeken, M., and Patas, J. (2010) "Evidence-based structuring and evaluation of empirical research in requirements engineering: Fundamentals, framework, research map", *Business & Information Systems Engineering*, Vol 2, pp 175-185.
- Gregor, S., and Jones, D. (2007) "The Anatomy of a design theory", *Journal of the Association for Information Systems*, Vol 8, No. 5, pp 312-335.
- Hevner, A. R., March, S. T., Park, J., and Ram, S. (2004) "Design science research in Information Systems", *MIS Quartely*, Vol 28, No. 1, pp 75-105.
- Jennex, M. E. (2015) "Literature reviews and the review process: an editor-in-chief's perspective", *Communications of the Association for Information Systems*, Vol 36, No. 1, pp 139-147.
- Kitchenham, B., and Charters, S. (2007) "Guidelines for performing systematic literature reviews in software engineering", Retrieved 10/11/2021, from file:///C:/Users/25509934/Downloads/Kitchenham-2007Systematicreviews5-8.pdf.
- Kuckertz, A., and Block, J. (2021) "Reviewing systematic literature reviews: ten key questions and criteria for reviewers". *Management Review Quarterly*, Vol 71, pp 519-524.
- March, S. T., and Storey, V. C. (2008) "Design science in the information systems discipline: an introduction to the special issue on design science research", *MIS Quartely*, Vol 32, No. 4, pp 725-730.
- Marshall, C., and Brereton, P. (2013) "Tools to support systematic literature reviews in software engineering: A mapping study", ACM/IEEE international symposium on empirical software engineering and measurement, Maryland, Baltimore, October.
- Morana, S., Schacht, S., Scherp, A., and Maedche, A. (2017) "A review of the nature and effects of guidance design features", *Decision Support Systems*, Vol 97, pp 31-42.
- Niemoller, C., Metzger, D., Berkemeier, L., Zobel, B., & Thomas, O. (2019) "Mobile service support based on smart glasses", *Journal of Information Technology Theory and Application (JITTA)*, Vol 20, No. 1, pp 4.
- Okoli, C., 2015. (2015) "A guide to conducting a standalone systematic literature review", *Communications of the Association for Information Systems*, Vol 37, pp 879-910.
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., and Chou, R. (2021) "The PRISMA 2020 statement: an updated guideline for reporting systematic reviews", *International journal of surgery*, Vol 134, pp 178-189.
- Siemon, D., Becker, F., Meyer, M., and Strohmman, T. (2022), "Addressing the Practical Impact of Design Science Research", 2022nd Americas Conference on Information Systems (AMCIOS), Minneapolis, USA, August.
- Simmert, B., Ebel, P. A., Peters, C., Bittner, E. A. C., and Leimeister, J. M. (2019) "Conquering the Challenge of Continuous Business Model Improvement: Design of a Repeatable Process", *Business & Information Systems Engineering*, Vol 61, pp 451-468.
- Simonofski, A., Serral Asensio, De Smedt, J., and Snoeck, M. (2019) "Hearing the voice of citizens in smart city design: the citivoice framework", *Business & Information Systems Engineering*, Vol 1, pp 665-678.
- Stefanovic, D., Havzi, S., Nikolic, D., Dakic, D., and Lolic, T. (2021) "Analysis of the tools to support systematic literature review in software engineering IOP", IXth International Conference on Engineering and Technology, Conference Series: Materials Science and Engineering, Thailand, May.
- Stroup, D. F., Berlin, J. A., Morton, S. C., Olkin, I., Williamson, G. D., Rennie, D., Moher, D., Becker, B. J., Sipe, T. A., and Thacker, S. B. (2000) "Meta-analysis of observational studies in epidemiology: a proposal for reporting", *Jama*, Vol 283, No. 15, pp 2008-2012.

Sturm, B., and Sunyaev, A. (2019) "Design principles for systematic search systems: a holistic synthesis of a rigorous multi-cycle design science research journey", *Business & Information Systems Engineering*, Vol 61, pp 91-111.

Sundaram, G., and Berleant, D. (2023) "Automating Systematic Literature Reviews with Natural Language Processing and Text Mining: a Systematic Literature Review", VIIIth International. Congress on Information and Communication Technology.

vom Brocke, J., Hevner, A., and Maedche, A. (2020) "Introduction to design science research In *Design science research*". Cases, pp 1-13.

Wieringa, R. J. (2014) *Design science methodology for information systems and software engineering*. Springer.

Appendix

Appendix 1: Reviewed Artificial intelligence research tools

	Elicit	Lit maps	Research Rabbit	ChatGPT	Consensus
S1 Defining the need for review	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
S2 Define the research questions	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
S3 Determine a protocol for the review	X	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
S4 Evaluate review protocol	X	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
S5 Identification of the research/Search string Development	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
Literature search	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
S7 Selection of studies (Inclusion & Exclusion)	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
S8 Assessing Study Quality	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
S9 Data extraction and monitoring	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
S10 Data synthesis	X	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
S11 Specifying dissemination mechanisms	X	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
S12 Formatting the main report	X	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X
S13 Evaluate the report	X	X	X	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	X

Consumers' Attitude Towards Useability of Cashless Transactions in the Thai Nakhon Ratchasima Province : A Structural Equation Modeling Approach

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Abstract: The rapid adoption of new financial technology affects consumers' attitudes toward cashless transactions and helps entrepreneurs understand how consumers' behavioral changes are significant. This research investigates the variables that influence consumers' attitudes toward cashless transactions. The questionnaire was a research tool, and the sampling method was a non-probability sampling technique. Two hundred participants with experience and knowledge about cashless transactions were considered the research sample. The questionnaires were used face-to-face, and the researchers explained the unclear questions until they were clear to the participants. The research data analysis included descriptive and inferential statistics, which were imposed using structural equation modeling (SEM). Based on the research findings, consumers' perceived risk has a significant and positive relationship with consumers' lifestyles, as consumers are aware of the information leaking and data disclosure, which affects consumers' activities and interests. Consumer purchasing behavior in the clothing industry is rapidly changing as new technology for purchasing support has changed. Consumers' attitudes towards sustainability have a significant impact on their purchasing intentions. Consumers' perceived value is fundamental to their product performance. Consumers are willing to pay for the best product value, such as price differentiation, ease of use, and transaction costs. Consumers' lifestyles directly influence their attitudes, as they are more interested in new financial transaction tools. Furthermore, consumers' lifestyle is a mediator variable between consumers' perceived risk and attitude, and consumers' perceived value is a mediator variable between consumers' perceived risk and attitudes. Based on the research findings, the suggestions that consumers' attitude towards the usability of cashless transactions is very positive, then entrepreneurs will adapt to cashless transactions for business operations. This is the value creation of a cashless society and business operations.

Keywords: Consumer attitude; cashless transaction; consumer perceived value; consumer perceived risk; structural equation modelling

1. Introduction

The development and technology adoption by consumers changes their money transaction mindset. New money transactions were identified, such as online transfers, e-wallets, mobile banking, and credit cards. The popularity of new money transfer methods has created a cashless society and new online shopping transactions. A cashless society is a new economic concept driven by cashless transaction methods that reduce cash touching. A new technology using computers has been introduced, and consumers' spending tends to prefer online shopping. Advancements in new technology development create multiple channels of online transactions that enhance consumer convenience. The primary tool for cashless transactions is a smartphone, which makes it easier to install cashless transfer applications. New consumer behavior is influenced by cashless transactions that do not carry cash, and smartphones have become new consumer money wallets. Cashless transactions reduce cash amounts in the economic cycle and reduce operational costs. Consumers' perceived usefulness of bank cards significantly affects bank card use. Furthermore, consumer behavior, attitudes toward credit cards, and subjective norms influence consumers' perceived usefulness (Aboubaker & Mohamed, 2022).

Covid-19 was spreading in 2019, and Thai consumers adopted new digital technologies to purchase goods and pay bills online. The social distancing policy made consumers stay home and purchase products and foods from online platforms. Consumers using online transactions increased from 135 transactions per consumer in 2018 to 202 transactions per consumer in 2019, an increase of about 50%, particularly for Internet and mobile banking transactions. During the Covid-19 pandemic, fintech companies changed their business models and innovative products, increasing their cashless transactions. Cyber risks have increased from cashless transaction growth, and business digitalization has increased, driven by Covid-19 spreading (Fabris, 2022). Quick response (QR) consumer payments gradually increased during the Covid-19 pandemic. However, consumers' perceptions of severity and health concerns make QR payments by mobile banking preferable (Ming, et al., 2022)

Based on the details above, most research has studied the effect of Covid-19 effect on consumer behavior, and few studies have examined consumers' cashless attitudes. Thus, the research gap is that consumers' attitudes toward the usefulness of cashless transactions are essential and need to be explored further. This research

focuses on consumers' attitudes toward using cashless transactions in Nakhon Ratchasima Province, the second-largest city in Thailand. To address this research gap, this study concentrates on understanding consumers' attitudes toward cashless transaction useability variables such as consumers' perceived risk, consumer's lifestyles, and consumer's perceived value. These research outcomes will help entrepreneurs adapt business operations to consumer satisfaction and experience. The research objectives were as follows:

1. To study the influenced factors for consumers' attitudes towards the useability of cashless transaction.
2. To analyze the relationships between consumer perceived risk, consumer lifestyle, consumer perceived value, and consumer attitude towards the useability of cashless transaction.
3. To analyze the indirect effect of mediator variables, consumer lifestyle, and consumer-perceived value.

1.1 Theoretical framework and hypothesis development

This research uses consumer purchasing intention and customer satisfaction theories as the principles for conceptual framework development. The literature review recognized that consumer purchase intention is a primary factor in creating consumer attitude toward usability when customers have high trust in products and customer perceived risk is less concerning (Hong et al., 2023). Online purchasing is growing in popularity because it is convenient for customers. Customer satisfaction from online purchasing influences repurchase behavior, as customers perceive the value of online useability (Rudy, et al., 2022).

1.2 Attitude towards useability

Food and supplementary consumption have increased, but the lack of herbal literacy causes consumers to suffer from the use of herbal medicines. Easy access to information improves consumer attitudes toward useability, and herbal food and supplementary producers must provide easily accessible information for consumers (Khampang et al., 2022). Since the start of Covid-19, people's access to the healthcare system has been challenging and has had multiple healthcare problems. Inadequate healthcare access is a significant problem for patients, and an appropriate healthcare facility for easy access must be improved for useability. All-access dimensions must be developed to improve customer experience and healthcare services (Coombes et al., 2022). Online cannabis sales are growing in Canada, as consumers have easy access and convenience to purchase. Online sellers must improve their websites for information accessibility and convenience for consumers' attitude enhancement (Ng et al., 2022). The wearable chair assists workers by supporting the exoskeleton. The perceived usability of a wearable chair depends mainly on the user's behavior, which differs from the results used. The development of wearable chairs must consider consumer behavior, which leads to innovative products (Gumasing, et al., 2022).

1.3 Consumer perceived risk

The advantage of social networks and Covid-19 have made consumers' purchasing behavior. Most consumers prefer e-commerce platforms for product buying in which consumers must provide privacy information. However, privacy disclosure and perceived risk suppress consumer confidence (Yixuan & Yumin, 2022). The development of online purchasing faces challenges in terms of consumer data protection and payment security. Consumer-perceived risk negatively influences consumer attitudes toward online purchasing, and online providers need to revise their privacy policy (Shaizatulaqma et al., 2018). However, online purchasing risk could be more attractive to retailers, as they are still facing risk with product selection, which certainly affects their business performance. Consumers will undoubtedly perceive risk when they want to purchase a product online; therefore, their perceived risks directly influence online sales (Kurtz et al., 2021). Facebook advertisements in Vietnam influence consumers' attitudes toward advertisements. Consumer peevishness and privacy concerns have a negative impact on consumer perceptions and purchasing behavior. Online advertisements must consider consumers' perceived risk when creating content and selling products (Nguyen-Viet, et al., 2022).

1.4 Consumer lifestyle

Consumer lifestyle changes as they relate to minimization. Consumers prefer to purchase less, which affects their well-being and satisfaction. Consumers with high satisfaction levels tend to have a positive lifestyle and are highly emotional. Manufacturers adapt their production according to consumer minimization, which changes

their consumer lifestyle (Shafqat et al., 2023). Consumers' preferences for healthier products pay high prices and recommend the preferred products to producers. Consumers' healthier lifestyles will select suitable products even if the price is high, as it reflects the consumer's lifestyle (Alsubhi et al., 2023). Consumers' physical activities did not change during the Covid-19 spreading, but they preferred to purchase healthy food. Experience and taste influence consumer purchasing attitudes, eating habits, and purchasing behavior changes (Imrovič et al., 2022). The characteristics of honey consumption, such as nutritional and therapeutic properties, are different. Consumer characteristics drive honey consumption but not consumer lifestyle, which comes from consumer interest. Policymakers should emphasize consumer interests when promoting honey consumption (Zanchini, et al., 2022).

1.5 Consumer perceived value

In the cell phone industry, consumer delights and loyalty come from perceived service providers and product value. Service provider skills that influence consumers' perceived value and loyalty need to be improved (Roberts-Lombard et al., 2020). Perceived customer service skills, product value, and product trust significantly impact consumer satisfaction and delight. Service providers change service delivery, which positively influences consumer satisfaction, delight, and trust (Jaiyeoba et al., 2020). Retailers' sharing economy has dramatically increased, and collaboration between retailers has deepened. Ownership of the application platform led to customer co-creation and perceived value as customer anticipation brought about excellent service quality and perceived credibility (Mai & Ketron, 2022). With the advancement of the Internet and technology, online retailers must consider product value uncertainty and consumers' anticipation of regret. As consumers purchase the product ahead of time, online retailers need a clear product-return process to protect the uncertainty of perceived product value (Sijja & Zhenzhong, 2022).

1.6 The mediating roles between consumer perceived risk and consumer attitude towards useability

This research further explored the relationship between consumer-perceived risk and consumer attitude towards useability through mediator variables. They found that consumer lifestyle is related to consumer-perceived risk and attitude toward useability. Consumers' perceived value and risk are key factors for their sustainable purchasing intention. Perceived risk is the consumer's product and service performance, which has a negative tendency toward product and service outcomes (Lin & Chen, 2022). Moreover, consumers' perceived risk and purchasing intention have a positive relationship with consumers' lifestyles in electric vehicle businesses (Xie et al., 2022).

The research also finds that consumers' perceived value mediates the relationship between consumers' perceived risk and their attitudes toward useability. The advantage of Internet use is that it enhances consumers' health activities and supports their perceived Internet usefulness. Consumers' perceived value of Internet use has a positive relationship with consumers' attitudes and risk, as consumers are concerned about the health risk of chronic disease (Gunasekara et al., 2022). Consumers have a positive attitude towards product useability when they perceive product value. Perceived value, performance expectancy, and social influence have a positive and significant relationship with consumers' attitudes when purchasing products from convenience stores. However, consumers' perceived risk has a negative effect on their attitudes toward product purchasing at convenience stores between consumers who have experience with payment machines and those who do not (Lin, 2022). Based on the literature review, hypothesis testing is proposed below:

H1 Consumer's perceived risk has a positive effect on consumer's lifestyle

H2 Consumer's lifestyle has a positive effect on consumer's attitude towards useability

H3 Consumer's perceived risk has a positive effect on consumer's perceived value

H4 Consumer's perceived value has a positive effect on consumer's attitude towards useability

H5 Consumer's perceived value has a positive effect on consumer's lifestyle

H6 Consumer's perceived risk has a positive effect on consumer's attitude towards useability

The definition of consumers' attitudes toward useability from previous studies is related to consumers' perceived values and lifestyles. Therefore, the confirmation of consumers' perceived value and lifestyle testing for mediator variables is proposed:

H7 The association between consumers' perceived risk and consumers' attitude towards useability is mediated by consumers' lifestyle

H8 The association between consumers' perceived risk and consumers' attitude towards useability is mediated by consumers' perceived value

2. Research Methodology

The questionnaire is a research tool, and the sampling method is a non-probability sampling technique. Participants were asked about their perceived risk, lifestyle, value, and attitude toward using cashless transaction variables. Participants who lived in Nakhon Ratchasima Province and had experience and knowledge about cashless transactions were considered the research sample. The survey was conducted in November 2022, and face-to-face questionnaires were used. The researchers explained the unclear questions until they were clear to the participants. The questionnaires were delivered about 500 questionnaires. However, 200 questionnaires were completed due to the Covid-19 pandemic restriction. The research data analysis included descriptive and inferential statistics imposed by structural equation modeling (SEM).

3. Results

3.1 Consumers' demography

Based on the survey results, the majority of the 200 respondents were female, accounting for 129 respondents (64.5 %). The remaining 71 respondents (35.5 %) were male. The respondents were primarily aged between 31-40 years, 108 respondents, 54%), followed by 41-50 years (53 respondents, 26.5%). There were 23 respondents (11.3 %) who were less than 30 years old, and 16 respondents (8.2 %) were more than 51 years old. Regarding monthly income, the primary respondents earned between 526-1,050 USD, accounting for 140 respondents (70 %). The remaining respondents earned more than 1,581 USD (24 respondents, 12%), more than 1,581 USD (18 respondents, 9%), and less than 525 USD (18 respondents, 9%) respectively.

Table 1: Demography

Participants	Frequency (Respondents)	Percentage (%)
Gender		
Male	71	35.5
Female	129	64.5
TOTAL	200	100%
Age		
<30 years	23	11.3
31-40 years	108	54.0
41-50 years	53	26.5
>51 years	16	8.2
TOTAL	200	100%
Income (Monthly)		
<525 USD	18	9.0
526-1,050 USD	140	70.0
1,051-1,580 USD	18	9.0
>1,581 USD	24	12.0
TOTAL	200	100%

Table 2 shows that credit card and debit card payments were the most popular cashless payment methods among the 104 respondents. Additionally, 86 respondents had experience with prompt pay payments and e-wallet payments, 79 respondents had used mobile banking payments, and 64 respondents had tried QR code payments. As for the customers' payment by cashless methods, the results show that 144 respondents opted

for phone bills via the Internet, while 119 respondents paid for housing and accommodation bills. Moreover, 101 respondents paid for food and drink bills, 90 paid for personal items bills, and 77 paid for electricity and utility bills. Ultimately, 76 respondents used e-wallet applications (Shopee and Lazada).

Table 2: The experience with cashless payment methods

Cashless payment methods	Frequency					Total
	1	2	3	4	5	
Credit card/ Debit card payments	20	18	20	38	104	200
Mobile Banking payments	79	44	32	25	20	200
QR Code payments	42	46	64	20	8	200
Prompt Pay payments	28	86	38	30	18	200
E-wallet payments	18	20	24	86	52	200
Product/Service payment by cashless methods						
Pay phone bills via Internet	16	14	16	10	144	200
Pay for housing and accommodation bills	18	12	7	44	119	200
Pay for electricity and utility bills	18	35	40	77	30	200
Pay for food and drink bills	101	30	40	24	5	200
Pay for e-wallet application (Shopee, Lazada)	45	76	25	30	24	200
Pay for personal items bills	20	30	90	20	40	200

Table 3 shows the variables' mean, standard deviation, and correlation matrix. Consumers' perceived value is the most significant variable for their attitude towards useability, followed by their lifestyle and perceived risk. Additionally, the correlation between variables is linear, which describes the variables that are independent of each other.

Table 3: Mean, Standard Deviation and Correlation matrix

	Mean	SD	Perceived risk	Lifestyle	Perceived value	Attitude towards useability
			Correlation estimations			
Perceived risk	3.52	1.166	1			
Lifestyle	3.94	1.095	0.587**	1		
Perceived value	4.06	0.984	0.612*	0.591**	1	
Attitude towards useability	4.03	1.015	0.484**	0.513**	0.591**	1

Note: * Significant at 0.05 and ** Significant at 0.01level

3.2 Path analysis and research hypothesis testing

The results of the path analysis are presented in Table 4. The standardized estimates of the path coefficient are less than 1, and the hypothesis testing results show that consumers' perceived risk has a significant and positive relationship with their lifestyle (H1) ($\beta=0.31$, $p<0.05$). Consumers' lifestyles have a significant and positive relationship with their attitudes toward useability (H2) ($\beta=0.59$, $p<0.001$). Consumers' perceived risk has a significant and positive relationship with their perceived value (H3) ($\beta=0.33$, $p<0.001$). Consumers' perceived value has a significant and positive relationship with their attitudes toward usefulness (H4) ($\beta=0.32$, $p<0.001$). Consumers' perceived value has a significant and positive relationship with their lifestyle (H5) ($\beta=0.72$, $p<0.001$), and consumers' perceived risk has a significant and positive relationship with their attitude toward useability (H6) ($\beta=0.73$, $p<0.05$) respectively.

Table 4: Hypothesis testing

Hypothesis	Paths	Path Coefficient	P-value	Relationship
H1	PR → LS	0.31*	0.001	Supported
H2	LS → AU	0.59***	0.002	Supported
H3	PR → PV	0.33**	0.003	Supported
H4	PV → AU	0.32***	0.002	Supported
H5	PV → LS	0.72***	0.001	Supported
H6	PR → AU	0.73*	0.001	Supported

Note: *Sig at 0.05 level, ** Sig at 0.01 level, *** Sig at 0.001 level

3.3 Mediation analysis

Table 5 presents the results of the mediation analysis. Mediation analysis is a part of structural equation modeling, which is used for the indirect effect between causal variables and certain variables with mediator variables. For this research, the mediator variables were consumers' lifestyles and consumers' perceived value. The first mediation hypothesis, consumers' lifestyle, is the partial mediator in the relationship between consumers' perceived risk and attitudes towards useability (H7). Second, consumers' perceived value is a mediator in the relationship between consumers' perceived risk and their attitudes toward useability (H8). The results of the direct effect between consumers' perceived risk and their attitudes toward useability are significant ($\beta=0.73$, $p<0.05$). The mediator testing is specified with the mediator variable, consumers' lifestyle, which is 0.27 and lower than the direct effect (0.73) and significant. Then, the consumers' lifestyle is a mediator variable between consumers' perceived risk and consumers' attitudes towards useability (H7).

The mediator testing is specified with the mediator variable, consumers' perceived value, which is 0.50, lower than the direct effect (0.73), and significant; then, consumers' perceived value is a mediator variable between consumers' perceived risk and attitudes towards useability (H8).

Table 5: Mediation analysis

Hypothesis	Paths	Direct effect	Indirect effect	Mediation	Relationship
	PR → AU	0.73*			Supported
H7	PR → LS → AU		0.273	partial	Supported
H8	PR → PV → AU		0.502	full	Supported

Note: *Sig at 0.05 level, ** Sig at 0.01 level, *** Sig at 0.001 level

4. Discussion

Consumers' attitudes towards sustainability have an impact on their purchasing intentions. Consumer concern impacts interest and intentional behavior (Rausch & Kopplin, 2021). Food safety concerns influence consumer behavior, which comes from consumers' knowledge and perceptions. Risk perception directly affects consumer practices for food safety buying behavior, and food manufacturers need to communicate food safety knowledge to consumers (Luu et al., 2023). Thus, H1 is supported. Consumers are willing to pay more for healthy food as they prefer to maintain their lifestyle, and consumers with a higher income prefer to pay for premium healthy food items (Alsubhi et al., 2023). Then, H2 is supported.

Consumers experience the difficulty of innovative products when they are innovative. However, consumers are also required to use it. If innovative products are associated with negative performance, consumers seem to avoid using them for perceived risk mitigation (Min, 2023). Consumers' perceived risk has a positive relationship with their perceived value, and H3 is supported. Hand hygiene is critical in the food industry, and manufacturers have introduced artificial intelligence (AI) for handler hygiene. The manufacturers' perceived benefits of artificial intelligence use help in the attitude of training and food safety assessment (Evans et al., 2023). The research results show that consumers' perceived value has a positive relationship with their attitudes toward useability, and H4 is supported. The perception of value is an individual lifestyle for consumers who prefer different price levels and difficulty to use. If the product is difficult to use, consumers rarely perceive the value of the product (Gideon et al., 2021). The research results show that consumers' perceived value has a positive and significant

relationship with their lifestyles, and H5 is supported. Consumers' attitudes towards biotechnology influence biotechnology adoption. When consumers are concerned about biotechnology risk, they affect their attitudes toward biotechnology use. Marketers must understand consumers' risks before developing marketing strategies (Bayoglu & Özgen, 2010). Consumers' perceived risk positively correlates with their attitudes towards useability, and H6 is supported. The relationship between risk perception, willingness to pay a premium price, and attitude towards use have a significant relationship, which is a product-related perception concept (Xie et al., 2022), which is a partial mediator that supports H7.

While H8 testing is the association between consumers' perceived risk and consumers' attitude towards useability is mediated by consumers' perceived value, the coefficient (β) of the indirect effect is 0.50, and significant, then consumers' perceived value variable is a full mediator that supports H8.

5. Conclusion

5.1 Theoretical contributions

This research applied consumer purchasing intention and customer satisfaction theories to the principle of conceptual framework development. Furthermore, this research extends the theory of consumer purchasing intention and customer satisfaction from a literature review to a conceptual framework with mediator variable creation. The findings help entrepreneurs understand consumers' attitudes towards the useability of cashless transactions for business adaptation, as consumers prefer to use cashless transactions.

The results fully support previous research findings. Consumer behavior in online purchasing depends mainly on perceived value and has become very complicated in the social media era. Recommended advertising positively influences the purchasing of consumers who receive the informativeness and credibility value of the advertising (Cherouk, 2021). Effective information impacts product ease of use and consumer-perceived usefulness, as consumers have high satisfaction. However, consumers' perceived risk has a negative impact on purchasing intention, and manufacturers need to create consumer trust in e-commerce businesses (Qinchang, 2016).

5.2 Practical implications

The research results provide information and knowledge regarding entrepreneurs' decisions regarding business operations and economic changes. For example, the rapid growth of the Internet and cashless use by consumers has accelerated cashless transactions, and research information plays a vital role in business operations. Entrepreneurs can develop and deliver the following business strategies: 1) Create trust in the consumer, which helps mitigate consumer-perceived risk. 2) To deliver the value of cashless transactions to consumers. 3) is involved in consumer lifestyles by using a co-creation strategy.

Furthermore, the testing of the mediation variable demonstrated that consumers' perceived value and lifestyle are related to consumer attitudes towards the useability of cashless transactions, and entrepreneurs need to consider consumer lifestyle when creating products and services.

5.3 Research limitations

The research was conducted during the Covid-19 crisis, and sample assessments were challenging, which is considered a research limitation. The conceptual research framework was created during the crisis; other variables may influence consumers' attitudes toward the use of cashless transactions. In the future, consumers' perceived risk variables may have different issues, as this study was conducted during the crisis, and consumers may have different perceptions of risk.

References

- Aboubaker, E. and Mohamed, E., (2022). "The Move Towards Cashless Society: How to Improve Consumers' Use of Bank Cards in Retail Stores?" *Studies in Business and Economics*, Vol 17 no.1, pp. 24-40. doi:10.2478/sbe-2022-0002.
- Alsubhi, M. et al., (2023). "Consumer willingness to pay for healthier food products: A systematic review". *Obesity Reviews*, Vol 24 no. 1, pp. e13525. doi: 10.1111/obr.13525.
- Bayoglu, A. S. and Özgen, Ö., (2010). "An examination about the consumer attitudes towards biotechnology and perceived benefit and perceived risk". *Journal of International Social Research*, Vol 3 no. 10, pp. 90-103.
- Cherouk, A. Y., (2021). "Understanding Consumer Digital Consumption Behaviour in the Edge of Social Media Platforms". *Open Journal of Social Sciences*, Vol 9, pp. 394-416. doi: 10.4236/jss.2021.910028.

- Coombs, N. C., Campbell, D. G. and Caringi, J., (2022). "A qualitative study of rural healthcare providers' views of social, cultural, and programmatic barriers to healthcare access". *BMC Health Services Research*, Vol 22 no. 1, pp. 1-16. doi: 10.1186/s12913-022-07829-2.
- Evans, E. W., Bulochova, V., Jayal, A. and Haven-Tang, C., (2023). "Attitudes towards using artificial intelligence to determine real-time hand hygiene compliance in the food sector". *Food Control*, Vol 145, pp. 109439. doi: 10.1016/j.foodcont.2022.109439.
- Fabris, N., (2022). "Impact of Covid-19 Pandemic on Financial Innovation, Cashless Society, and Cyber Risk". *Economics*, Vol 10 no. 1, pp. 73-86. doi:10.2478/eoik-2022-0002.
- Gideon Buernartey, B. and Samuel, A., (2021). "Perceived Risk versus Perceived Value for Money: Assessing Online Retail Shopping Behavior among Ghanaians". *iBusiness*, Vol 13, pp. 117-143. doi: 10.4236/ib.2021.133008 .
- Gumasing, M. J. J. et al., 2022. "Factors influencing the perceived usability of wearable chair exoskeleton with market segmentation: A structural equation modeling and K-Means Clustering approach". *International Journal of Industrial Ergonomics*, Vol 93, , pp. 103401. doi: 10.1016/j.ergon.2022.103401.
- Gunasekara, N. P., Fernando, W. M. and Karunaratne, E., (2022). "Online health information-seeking behaviour: an empirical study of managerial-level employees in Sri Lanka". *International Journal of Pharmaceutical and Healthcare Marketing*, Vol 6 no. 4, pp. 490-512. doi: 10.1108/IJPHM-03-2021-0037.
- Hong, C., Choi, E.-K. and Joung, H.-W., (2023). "Determinants of customer purchase intention toward online food delivery services: The moderating role of usage frequency". *Journal of Hospitality and Tourism Management*, Vol 54, pp. 56-87. doi: 10.1016/j.jhtm.2022.12.005.
- Imrovič, M., Orliková, M., Šedík, P. and Bočáková, O., (2022). "Consumer Behavior of Young People in the Context of Health and COVID-19 Pandemic in Slovakia". *TEM Journal*, Vol 11 no. 4, pp. 1897-1905. doi: 10.18421/TEM114-58.
- Jaiyeoba, O., Svtowa, D. and Roberts-Lombard, M., (2020). "Precursors and outcome of customer satisfaction/delight in business-to-consumer relationships in Botswana". *South African Journal of Business Management*, Vol 51 no. 1, pp. 50-62. doi: 10.4102/SAJBM.V51I1.1809.
- Khampang, R., Kloyiam, S. and Butchon, R., (2022). "Relationship between socioeconomic, demographic, health and social characteristics and ability to access reliable information on herbal and food supplements: analysis of Thai Health Literacy Survey 2019". *BMC Public Health*, Vol 22 no. 1, pp. 1-10. doi: 10.1186/s12889-022-13454-9.
- Kurtz, O., Wirtz, B. and Langer, P., (2021). "An Empirical Analysis of Location-Based Mobile Advertising—Determinants, Success Factors, and Moderating Effects". *Journal of Interactive Marketing*, Vol 54, pp. 69-85. doi: 10.1016/j.intmar.2020.08.001.
- Lin, C.-Y., (2022). "Understanding consumer perceptions and attitudes toward smart retail services". *Journal of Service Marketing*, Vol 36 no. 8, pp. 1015-1020. doi: 10.1108/JSM-09-2020-0407.
- Lin, P.-H. and Chen, W.-H., (2022). "Factors That Influence Consumers' Sustainable Apparel Purchase Intention: The Moderating Effect of Generational Cohorts". *Sustainability*, Vol 14 no. 4, pp. 8905. doi: 10.3390/su14148950.
- Luu, H. P., Tran, T. T. H. and Truong, T. X., (2023). "Factors affecting consumers' food safety behavior in Vietnam". *Food Control*, Vol 143, pp. 109294. doi: 10.1016/j.foodcont.2022.109294.
- Mai, E. and Ketron, S., (2022). "How retailer ownership of vs. collaboration with sharing economy apps affects anticipated service quality and value co-creation". *Journal of Business Research*, Vol 140, pp. 684-692. doi: 10.1016/j.jbusres.2021.11.039.
- Min, B., (2023). "Interplay of consumer expectation and processing fluency in perception of product innovativeness and product evaluation". *European Journal of Marketing*, Vol 57 no.1 , pp. 283-324. doi: 10.1108/EJM-08-2021-0603.
- Ming, T. et al., (2022). "The Adoption of QR Code Mobile Payment Technology During COVID-19: A Social Learning Perspective". *Frontiers in Psychology*, Vol 12, pp. 1-10. doi:10.3389/fpsyg.2021.798199.
- Ng, J. Y., Tahir, U. and Lum, N., (2022). "The quality of health information provided on web sites selling cannabis to consumers in Canada is poor". *Harm Reduction Journal*, Vol 19 no. 1, pp. 138. doi: 10.1186/s12954-022-00691-9.
- Nguyen-Viet, B., Nguyen, Y. T. H., Le, T. H. and Do, S. B., (2022). "Factors Driving Consumers' Attitudes towards Facebook Advertisements in an Emerging Market: A Case Study of Vietnam". *Asian Journal of Business and Accounting*, Vol 15 no. 1, pp. 243-279. doi: 10.22452/ajba.vol15no1.8.
- Qinchang, Z., (2016). "The Impact of Characteristics of B2C Retailer on Purchasing Intention—Based on TAM Model". *Open Journal of Business and Management*, Vol 4, pp. 784-798. doi: 10.4236/ojbm.2016.44076.
- Rausch, T. M. and Kopplin, C. S., (2021). "Bridge the gap: Consumers' purchase intention and behavior regarding sustainable clothing". *Journal of Cleaner Production*, Vol 278, pp. 123882. doi: 10.1016/j.jclepro.2020.123882.
- Roberts-Lombard, M., Makola, L., Nkosi, T. and Mabhena, S., (2020). "Loyalty intentions as an outcome of customer delight in a services environment - A South African perspective". *African Journal of Business and Economic Research*, Vol 15 no. 4, pp. 71-96. doi: 10.31920/1750-4562/2020/V15N4A4.
- Rudy, Akbar, R. M., Satria, M. M. and Pradana, M. A. H., (2022). "Repurchase Intention: System Quality, Service Quality, Information Quality, and Customer Satisfaction on M-Commerce in Indonesia. Bandung", *IEEE*, pp. 1-5.
- Shafqat, T., Ishaq, M. I. and Ahmed, A., (2023). "Fashion consumption using minimalism: Exploring the relationship of consumer well-being and social connectedness". *Journal of Retailing and Consumer Services*, Vol 71, 1023015, pp. 50-62. doi:10.1016/j.jretconser.2022.103215.
- Shaizatulaqma, K. A., Thenmoli, M. and Yen-Nee, G., (2018). "Influence of consumers' perceived risk on consumers' online purchase intention". *Journal of Research in Interactive Marketing*, Vol 12 no. 3, pp. 309-327. doi: 10.1108/JRIM-11-2017-0100.

- Sijia, C. and Zhenzhong, G., (2022). "Return policy for online retailers in the presence of product value uncertainty and consumer anticipated regret". *Journal of Industrial Engineering and Engineering Management*, Vol 26 no. 5, pp. 181-195. doi: 10.13587/j.cnki.jieem.2022.05.015.
- Xie, R., An, L. and Yasir, N., (2022). "How Innovative Characteristics Influence Consumers' Intention to Purchase Electric Vehicle: A Moderating Role of Lifestyle". *Sustainability*, Vol 4 no. 8, pp. 4467. doi: 10.3390/su14084467.
- Yixuan, W. and Yumin, Z., (2022). "Influencing Factors and Measures of Users' Privacy Disclosure in Social E-commerce". *Studies in Media and Communication*, Vol 10 no. 2, pp. 81-90. doi:10.11114/SMC.V10I2.5617.
- Zanchini, R. et al., (2022). "Consumers' attitude towards honey consumption for its health benefits: first insights from an econometric approach". *British Food Journal*, Vol 124 no. 12, pp. 4372-4386. doi: 10.1108/BFJ-09-2021-0992.

Reaping Research Skills from the Rigorous Application of Design Thinking

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Abstract: This paper investigates the relationship between design thinking and the research process, and argues that design thinking can foster the development of research skills. The paper reports on a case where first year Information Systems students apply Design Thinking (DT) in an Internet of Things (IoT) practical assignment. The Hasso Plattner Institute (HPI)'s design thinking process is applied, which entails five phases: empathise, define, ideate, prototype and test. In the Empathise phase, students must collect and analyse data in order to understand user needs. This enables them to arrive at an evidence-based problem definition in the define phase. Later, during the test phase, data is again collected and documented on the user's experience of the prototype. User feedback is then compared with the documented user needs and adjustments are made to address the possible gap. While design thinking is not a conventional research methodology, its use in this manner adds rigour and a scientific base for devising creative solutions. In the group assignment, students were required to document their implementation of the five DT phases by means of a group blog, which was used to assess their projects. While assessing the blogs, the lecturers noted that the students who were more thorough and meticulous in documenting and analysing the user need data, were able to arrive at designs that more appropriately responded to the user's needs. Furthermore, students who provided quotes and/or transcripts of their user interviews, followed by similarly documented feedback during the demonstration and testing of their prototypes, not only convinced that they addressed the real user problem, but the rigour they applied facilitated more innovative designs. This was an interesting finding, because the innovation itself is usually associated with the creative phases (ideate and prototype) rather than the empathise and test phases. This paper argues that when applying DT in a rigorous manner, students are enabled not only to produce better designs, but they also gain valuable research skills for their future benefit.

Keywords: Design Thinking; Future of Work; User Needs Analysis; Research Skills; IoT group assignment

1. Introduction

The skills required for the future world of work are receiving increased attention. According to the World Economic Forum, the top skills that will be required by 2025 include analytical and critical thinking, innovation, complex problem-solving, reasoning and ideation (World Economic Forum, 2020). In the field of Information Systems (IS), critical thinking and problem-solving are recognized as foundational skills in the international undergraduate IS curriculum (Topi et al., 2010). To this end, the first year IS students at a South African university have a course focusing on critical thinking and problem-solving as part of their degree programme. The problem-solving component of the course covers analytical problem-solving as well as creative problem-solving. Creative problem-solving is taught by introducing students to the Hasso Plattner Institute's (HPI) design thinking process (Hasso Plattner Institute of Design at Stanford, n.d.). As part of the course, students are required to do a group assignment where they design and build an artefact using design thinking. While assessing the students' deliverables, the lecturers noted that the students gained more than just creativity and design skills. The student projects also benefited from the rigorous investigations they undertook to understand and document their user's needs, and the efforts that went into interpreting these needs to respond to them appropriately. This meant that the students also gained valuable research skills, since research is about a systematic inquiry that involves collecting, analysis and interpretation and reporting of data to the satisfaction of users (Mertens, 2019; Oates et al., 2022). After the lecturers personally noted how some students' final deliverables benefited from a rigorous investigation into their user's needs, it was decided to perform a case study to investigate whether this trend applied more generally across the student group. Hence, a research study was scoped around the class of 2022's student group projects. The study was guided by the following research question:

- *How does the application of design thinking assist first year Information Systems students to develop research skills? (Research skills refer to the skills needed to perform a systematic inquiry where one needs to collect, analyse, interpret, and report on data).*

This paper reports on the study that was undertaken to investigate the above research question. The rest of

the paper is organised as follows. In the next section, background literature is provided on design thinking and research skills. Thereafter, the case study is described in the research method section. Following this, the data analysis is presented, along with a discussion and interpretation of the findings. The paper ends with concluding remarks and suggestions for future research.

2. Background

This section covers background on design thinking, the research skills required by university students as well as the complementary relationship between design thinking and research skills.

2.1 Design thinking

Design thinking is an iterative, human-centred, problem-solving approach (Interaction Design Foundation, n.d.). It focusses on empathising with the user, user collaboration, ideation, and swift prototyping to create innovative solutions to ill-defined messy problems (Brown, 2009). It combines analytical and intuitive thinking and integrates the needs of people with the possibilities offered by technology (Hasso Plattner Institute of Design at Stanford, n.d.).

Different design thinking models which consist of three (IDEO, n.d.), four (Aalto University, 2016; Design Council, n.d.; Singapore Polytechnic, 2016) or five (Hasso-Plattner-Institute, n.d.; Stanford University Design Institute, n.d.) phases, and which are presented by design schools (Aalto University, 2016; Hasso-Plattner-Institute, n.d.; Singapore Polytechnic, 2016; Stanford University Design Institute, n.d.) and enterprises or organisations (Design Council, n.d.; IDEO, n.d.), exist. The HPI design thinking process is the one which students are taught in their first year IS course on critical thinking and problem-solving. This five-phase process involves empathising with users, defining the problem, ideating solutions, prototyping, and testing (Brown, 2009). The first phase involves understanding the needs and behaviours of the users. The focus is to gain an in-depth understanding of the problem. This step is essential as it allows designers to identify the root cause of the problem and to develop a solution that fulfils the needs of the users. The second phase is to define the problem with a clear and actionable problem statement. This phase is crucial as it sets the foundation for the design thinking process to follow. The third phase is ideation. During this phase numerous creative ideas are generated which could address the user's needs. The fourth phase, prototyping, involves the creation of a physical or digital representation of the chosen idea(s). This phase allows designers to test the solution and gather feedback from users to improve it. The focus of the prototype is not on selling the solution, but rather on showing it to the user to elicit feedback. The final phase, testing, involves testing the solution with users and refining it based on their feedback.

Liedtka (2015) describes the contemporary design-thinking process as a process driven by a hypothesis, focussing on both the problem and the solution. It is based on abductive reasoning and experimentation with several alternative solutions (and their constraints) which propose different possibilities in a contest to be chosen as the best option in an uncertain and ambiguous context. Iteration, re-thinking and learning through experimentation form central tasks in this process.

Design thinking has broad applications across various fields. Its ability to drive innovation, improve outcomes, and enhance user experiences has made it an attractive approach for businesses (Cagnin, 2018), healthcare (Smiechowski et al., 2021) and education (Stock et al., 2018). It has also been widely applied to address complex social problems and to improve the lives of individuals and communities (Chou, 2018).

2.1.1 *The benefits of design thinking*

One of the primary benefits of design thinking as a problem-solving approach is its ability to drive innovation (Brenner & Uebernickel, 2016). Design teams are encouraged to think outside the box, to challenge assumptions (Pontis & Van der Waarde, 2020) and to experiment with new ideas (Liedtka, 2011). Another benefit is the emphasis which design thinking places on collaboration and teamwork (Nguyen et al., 2021) which results in sounder innovations and in bringing people from different skill sets together. As design thinking places a strong emphasis on empathy during the needs discovery process, implementers succeed in meeting the needs of their users more effectively (Gasparini, 2015). Design thinking encourages experimentation with new ideas and solutions, even if outcomes are uncertain. This fosters a culture of experimentation which encourages teams to test and iterate their solutions until they reach the best possible outcome (Carlgren et al., 2016).

2.2 Research skills

In short, research refers to “a process of systematic inquiry that is designed to collect, analyse and interpret data” (Mertens, 2019). Oates complements this definition by focusing on the outcome of research: “Research is the creation of new knowledge, using an appropriate process, to the satisfaction of the users of the research” (Oates et al., 2022). According to Myers (2019), the research process of generating new knowledge is a creative activity.

2.1.2 Research skills required by IS graduates

At this stage, we first need to step back to gain an overall understanding of what is required of an IS graduate. An IS graduate is expected to have a sufficient understanding and knowledge of both the business or organisational environment and the information technology domain, in order to develop innovative information systems solutions to the benefit of the organisation (Topi et al., 2010). The skills required to perform this task include business analysis skills, a variety of technology skills as well as a set of soft skills that includes *inter alia* problem-solving skills. Where do research skills then belong, within this skill set? Several IS scholars regard a focus on research skills to be more relevant on a postgraduate rather than an undergraduate level (Lamp et al., 1996; Snoke, 2004).

Typical skills needed to perform proper scientific research on postgraduate level include: problem identification and creative thinking skills (to identify research questions or problems and to formulate a hypothesis); reading skills (to conduct a literature review on the research topic); critical thinking skills (to critically review and evaluate and synthesise information from various sources); research design skills (to choose an appropriate research methods); data collection skills; data analysis and problem-solving skills (using appropriate statistical or qualitative methods to analyse data); interpretation and synthesis skills; and documenting, writing and communication skills (Oates, 2022).

At undergraduate level, research skills are often grouped together with the basic information or media literacy skills (Reif et al.). However, Reif et al. (2005) claims that such a view disregards the important connection between research and problem-solving skills, the latter which is a foundational skill for IS graduates. Reif et al. (2005) compares the research and problem-solving processes step by step, showing that they are essentially the same. According to Reif et al. (2005), enhancing students’ research skills at undergraduate level provides far more than media literacy; rather, enhances their skills of problem-solving, critical thinking as well as creative thinking.

2.3 Relationship between design thinking and research

When we consider the definitions of research given above, as well as the claims of Reif et al. (2005), the links between design thinking and research are evident. Both are problem-solving processes and require: a deep understanding of the problem context at the onset (whether obtained by means of investigating the literature or studying the needs of a user); a focused problem statement to guide the investigation so as to arrive at meaningful results; a thorough search through available options to address the problem; and an iterative mode of working where possible outcomes are assessed against the original problem statement. Both scientific research and design thinking make use of hypotheses (educated guesses about the nature of a phenomenon or problem), although these hypotheses differ in their purpose, scope, and testability. Scientific research hypotheses aim to generate new knowledge and advance scientific understanding, while design thinking hypotheses are used to guide the ideation and prototyping processes (Liedtka, 2015). Whereas design thinking is perhaps better associated with creativity, research is equally known for its role in innovation. In this study, we argue that when design thinking is approached with requisite rigour, such as when applying the HPI design process (Hasso Plattner Institute of Design at Stanford, n.d.) it simultaneously contributes to the development of good research skills.

3. Research method

To respond to the research question, a case study was scoped around the student class of 2022’s group assignment projects. A descriptive case study was performed (Maree, 2007), with the 2022 student group forming a single case. The study followed an interpretive research philosophy, where the focus was on understanding an occurrence within its natural social setting (Oates, 2022). In the sections below, the case is described in more detail, followed by the data collection and analysis process.

3.1 Case description

The case consisted of the group of first year students enrolled for a course in critical thinking and problem-solving, as part of studying a three-year degree in IS at a South African university. There were 244 students enrolled for the course which was presented in the first semester (January to June) of 2022. Under the problem-solving component of the course, students were taught design thinking as an unstructured problem-solving approach. Their main project under this theme was a group assignment for which they had to form self-selected groups of 4-6 students. According to the assignment task, each group had to: "...design and build a prototype of a home automation device, using the design process of the Hasso Plattner Institute. The prototype must use microcontroller technology such as micro:bit, Arduino or Raspberry Pi. Your client (for the empathise phase) will be a homeowner of your choice. The product needs to be a consumer product for a household, garden or pets. For the prototype and test phases, you will need to demonstrate a tangible working prototype."

Forty student groups were formed. Each group had a blog space on the university's Learning Management System (LMS) where they had to provide evidence of their execution of the empathise, define, ideate, prototype and test phases. For the 'empathise phase', students had to provide evidence of an interview with their user (a homeowner). They had to supply a well-focused problem statement (one sentence) for the 'define phase' and 3 - 5 possible designs for the 'ideate phase', after which they had to upload a video demonstrating a working prototype, for the 'prototype phase'. Lastly, they had to supply 2 - 3 user quotes as proof of the feedback they received from their user during the 'test phase'.

3.2 Data collection and analysis

The data that formed part of the study was the information contained in the student blogs, as well as the student marks. Groups received a mark for each phase, as well as an overall mark. The marks were analysed quantitatively and the blogs qualitatively to address the research question. The lecturer who marked the assignments was not part of the research team, to reduce bias.

4. Results

Statistical analysis was conducted on two sets of data using IBM SPSS Statistics Version 28.0.1.0 (142). The first set of data pertains to the outcomes of the 40 student groups and the second set to the overall outcomes of the 244 students enrolled for the module. The purpose was twofold: to determine how design thinking can be used to support scientific inquiry; and whether the group assignment impacted other outcomes within the module.

4.1 Group outcomes assessment

Descriptive statistics pertaining to the assessment of the 40 student groups is shown in Table 1. Standard deviation measures within the dataset shows that the 'test' phase was the most spread, indicating that groups had widely varying success in this phase. Reasons for this could be students' deficient technical ability to test concepts in the field, or ineffective time allocation by the groups to complete the last phase of their assignment. 'Prototyping' was spread as well, albeit to a smaller degree, demonstrating that the groups delivered varying results as they progressed through the phases. Within the prototype phase, this could be attributable to their inability to effectively adopt technology to build a prototype, a lack of time allocated, or their inability to prioritise what could address their defined problem.

Table 1: Descriptive statistics of group results. Source: IBM SPSS

Stage of design thinking	N	Minimum	Maximum	Mean	Std. Deviation	Kurtosis	Std. Error
EMPATHISE	40	6.00	10.00	7.93	1.071	-.971	.733
DEFINE	40	4.00	10.00	6.50	2.253	-1.110	.733
IDEATE	40	.00	10.00	7.60	1.959	4.591	.733
PROTOTYPE	40	.00	10.00	7.95	2.470	6.488	.733
TEST	40	.00	10.00	6.60	3.241	-.209	.733

This is supported by the Kurtosis indicator, where prototyping showed a wide distribution. However, empathise and define was negative. Consequently, the collection and ability to understand problems was closely clustered, demonstrating that the design thinking approach provided a way for students to collect data on and understand the user problem in a scientific manner, as well as define it properly. The standard error is a precision estimate, showing that a 0.7333 sampling error can be expected.

The analysis focused on the results within the design thinking phases and their overall impact on the success of the approach. To provide a clear visualisation of these findings, Figure 2 illustrates how the results within the design thinking phases were overall positive for the 40 groups assessed. The figure highlights the significant impact that the prototyping and testing phases had on the success of the approach and provides valuable insights into the effectiveness of design thinking as a teaching method in promoting positive outcomes among students.

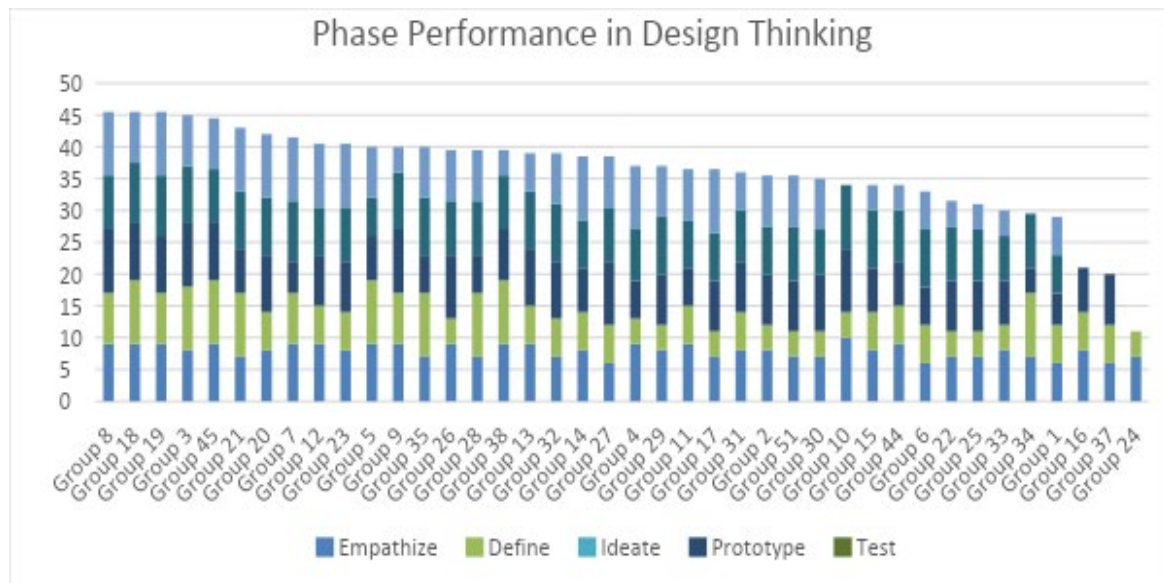


Figure 1: Overall group performance to deliver creative outcome

Using the analysis of variance (ANOVA), the results support the fact that students who were more thorough and meticulous in documenting and analysing user need data (done during the empathise phase) were able to arrive at designs that more appropriately responded to their users' needs. This finding is consistent in that user-centred design processes, which rely on careful observation, documentation, and analysis of user behaviour and feedback, are critical for developing effective and innovative designs. In particular, the results suggest that students who provided evidence of user interviews, followed by similarly documented feedback during demonstration and testing of prototypes, were more successful in convincing others that they had addressed a real user problem. This rigour not only facilitated more innovative designs but also increased the credibility of the design solutions in the eyes of the users. In the context of using design thinking as a teaching method, the ANOVA outcomes revealed valuable insights into the success of the approach. Specifically, the sum of squares (SS), which represents the variability in the dependent variable that is accounted for by each independent variable, was found to be influenced significantly by the prototyping and testing phases within the groups. Mean squares (MS) that represent variance accounted for by each independent variable supports this at 0.762 within groups. However, the test phase at 3.048 within groups shows that the final outcome was significantly different amongst groups through the iterative process. Moreover, the F-value (f) that represents the ratio of variance explained by the independent variable to the variance not explained by the independent variable, shows that the prototype and test phases at 11.93 and 4.86 respectively varied the most. This suggests that the design thinking process, which emphasises iterative steps, was successful in developing research skills such as obtaining information to understand problems. However, the last phases differed, where the group's ability to develop a prototype and test varied significantly. This could be due to the reasons mentioned before.

4.2 Group marks that correlate to individual success

Factor analysis was used as an exploratory technique to uncover any underlying structure of the dataset where 244 students' outcomes were assessed to identify patterns of intercorrelations among the observed variables.

While processing the analysis of results of group outcomes to individual success, several assumptions were made including that (1) there are no outliers, (2) there was a sufficient sample size (>200), (3) no perfect multicollinearity exists and (4) all data is interval data. All factor scores were above 0.7 representing that the factors extracted sufficient variance, in this instance the group assignment. To determine if the data was suitable for factor analysis, the Kaiser-Meyer-Olkin (KMO) test was used as it is a measure of sampling adequacy. Values range between 0 and 1, with values closer to 1 indicating better suitability for factor analysis. An acceptable value for the KMO test is typically considered to be above 0.6. In this instance 0.642 was achieved. Moreover, the Bartlett test was used to assess the homogeneity of variances across different groups or samples. An acceptable result for the Bartlett test is a low p-value, typically less than 0.05. In this instance it was significant at <.001. Consequently, a one-tailed hypothesis test was deemed appropriate. This tested for significance in only one direction because it allowed for a more focused testing of the specific direction of the effect, rather than testing for any significant difference, regardless of direction. Overall, the group assignment shows to have significantly impacted individuals' ability to not only factor in scientific analysis, but also improve their overall examination capabilities and understanding of the subject material as shown in Table 2.

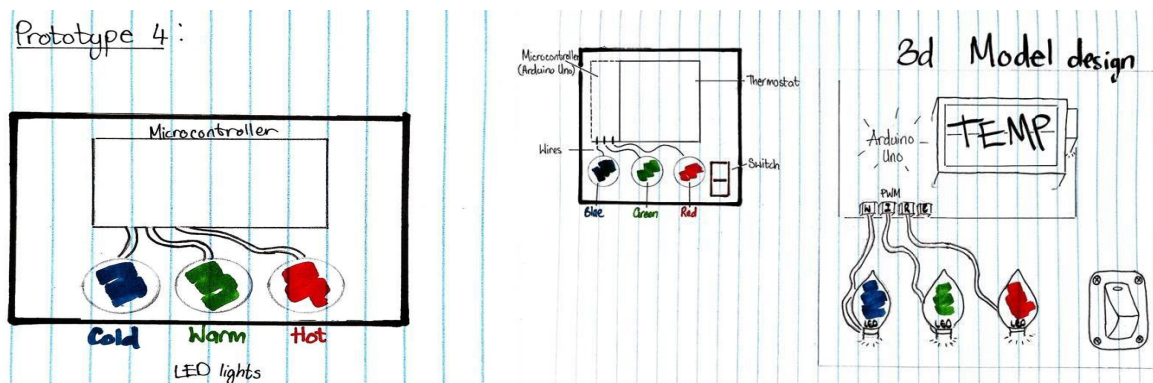
Table 2: Factor analysis of design thinking as a teaching tool. Source: IBM SPSS.

		DTGROUP	SM	ST	EXAM
Correlation	DTGROUP	1.000	.654	.191	.382
	SM	.654	1.000	.704	.679
	ST	.191	.704	1.000	.479
	EXAM	.382	.679	.479	1.000
Sig (1-tailed)	DTGROUP		<.001	.001	<.001
	SM	.000		.000	.000
	ST	.001	.000		.000
	EXAM	.000	.000	.000	

4.3 Qualitative data where the iterative design process was used

The findings suggest that the level of rigour displayed by the groups was a key factor in their success in applying systematic inquiry within the design thinking process. Specifically, those groups that demonstrated a higher level of rigour were able to articulate their inquiry in a more systematic manner and apply it more effectively throughout the different phases of the process. These patterns were evident in the clustering of groups within each phase of the design thinking process. However, when groups deviated from the process and displayed a lower level of rigour, the distribution of their results became more widely spread, as seen in Figure 1 and supported by the ANOVA analysis. Below is a snapshot of a successful group who followed the iterative process.

Group 8 developed a device to monitor the temperature of a geyser. One of their prototype feedback quotes included "As a stay-at-home mom I must say that the device has helped save quite a significant amount of electricity since the different colour lights notify me when I should turn the geyser on and off. Also, the device displays the temperature, that is a great addition. Electricity wastage is totally being eliminated!!". Their process and outcome are shown in Figure 3.



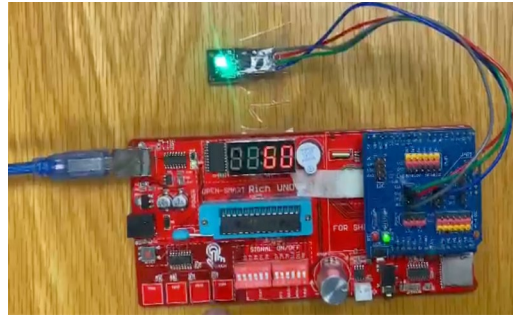


Figure 3: Group 8 documentation and research analysis to develop a solution.

5. Discussion

The first two phases of the design thinking approach followed by students were ‘emphasise’ and ‘define’ (Hasso Plattner Institute of Design at Stanford, (n.d.)). These two phases have underlying cognitive processes of exploration and generation (Stempfle & Badke-Schaub, 2002) and require the designer to understand the needs and behaviours of the user, to gain an in-depth understanding of the problem, and to define the problem with a clear and actionable problem statement (Brown, 2009). The findings show that students were able to handle these two phases comfortably and that the design thinking approach equipped them with skills to collect data to understand their user’s problem in a scientific manner, and to define their user’s problem properly. Furthermore, groups who were more thorough and meticulous in documenting and analysing their user need data, by providing quotes and/or transcripts of their user interviews, were able to arrive at designs that more appropriately responded to their user’s needs. The groups in general seemed to struggle more with the last phases of the design thinking approach, which have underlying cognitive processes of comparison and selection (Stempfle & Badke-Schaub, 2002), and which requires the groups to select, develop and test the most suitable prototype, varied significantly. This could be due to the students’ inability to effectively adopt the IoT technology to build their prototypes (for many of them it was their first encounter with this technology) or their inability to manage their time, leading to them rushing through the last two phases in an attempt to finish their assignment on time. Important to note is that the results do show that students who provided evidence of their user interviews, followed by detailed documented feedback during the demonstration and testing of their prototypes, were more successful in convincing others that they addressed the real user problem. As the steps with which the students were successful point to the application of problem identification, creative thinking, data collection, documenting, writing, and communication skills, which are all considered to be important research skills (Oates, 2022), the findings suggest that the design thinking approach taught to undergraduate students as a problem-solving approach to tackle ill-defined messy problems, seems to have cultivated and fostered important research skills.

6. Conclusion

The aim of this paper was to argue that teaching the design thinking approach to problem solving, fosters better research skills for undergraduate IS students. The study was guided by the following research question: *How does the application of design thinking assist first year Information Systems students to develop research skills?* A descriptive case study was carried out, centred around a design thinking group assignment performed by 244 first year South African Information Systems students, as part of a critical thinking and problem-solving course. In the preceding literature review, a strong alignment was found between research and design thinking. In particular, the HPI design process requires a thorough investigation into user needs, involving data collection, analysis and interpretation. The findings of the empirical study showed that design thinking equipped students with skills to collect data to understand their user’s problem in a scientific manner, and to define their user’s problem properly. It further showed that groups who were thorough and meticulous in documenting and analysing their user need data, were able to arrive at designs that more appropriately responded to their user’s needs. While some groups struggled with the practical prototyping and testing of their designs, where various external factors started playing a role, the HPI process at least provided them with good guidance to perform well in the earlier phases which was where research-like activities were required. These findings have important implications for design education and practice. They suggest that designers who invest time and resources in carefully documenting and analysing user behaviour and feedback are more likely to develop successful and innovative designs. Additionally, these findings highlight the importance of teaching design

students to engage in user-centred design processes and to prioritise user needs in their work.

This study was limited to a single descriptive case of a first year Information Systems class in South Africa. Future research can entail repeating the study with more detailed hypothesis, as well as requiring from students to reflect on their own learning during similar assignments. The continuation of this project holds many possibilities for research and practice, showing how fostering of the skills base underlying both research and design, can contribute to building innovation and problem-solving skills that are essential for the future world of work.

References

- Aalto University. (2016). *Executive programs - Design Thinking for Business*. Retrieved 28 March 2023 from <http://www.aaltoee.com/program/design-thinking-business-innovation/general-info>
- Brenner, W., & Uebernickel, F. (2016). Design thinking for innovation. *Research and Practice*.
- Brown, T. (2009). *Change by design: How design thinking transforms organizations and inspires innovation*. New York: Harper-Collins.
- Cagnin, C. (2018). Developing a transformative business strategy through the combination of design thinking and futures literacy. *Technology Analysis & Strategic Management*, 30(5), 524-539.
- Carlgrén, L., Rauth, I., & Elmquist, M. (2016). Framing design thinking: The concept in idea and enactment. *Creativity and innovation management*, 25(1), 38-57.
- Chou, D. C. (2018). Applying design thinking method to social entrepreneurship project. *Computer Standards & Interfaces*, 55, 73-79.
- Design Council. (n.d.). *A study of the design process*. 2016, from [http://www.designcouncil.org.uk/sites/default/files/asset/document/ElevenLessons_Design_Council%20\(2\).pdf](http://www.designcouncil.org.uk/sites/default/files/asset/document/ElevenLessons_Design_Council%20(2).pdf)
- Gasparini, A. (2015). Perspective and use of empathy in design thinking. ACHI, the eight international conference on advances in computer-human interactions,
- Hasso-Plattner-Institute. (n.d.). Retrieved 27 March 2023 from <https://hpi.de/en/school-of-design-thinking.html>
- Hasso Plattner Institute of Design at Stanford. (n.d.). *An Introduction to Design Thinking Process Guide*. Retrieved 28 March 2023 from <https://dschool.stanford.edu/resources/an-introduction-to-design-thinking-process-guide>
- IDEO. (n.d.). *Expertise*. Retrieved 27 March 2023 from <https://www.ideo.com/about/>
- Lamp, J. W., Keen, C., & Urquhart, C. (1996). Integrating professional skills into the curriculum. African Conference on Software Engineering,
- Liedtka, J. (2011). Learning to use design thinking tools for successful innovation. *Strategy & Leadership*, 39(5), 13-19.
- Liedtka, J. (2015). Perspective: Linking Design Thinking with Innovation Outcomes through Cognitive Bias Reduction. *Journal of Product Innovation Management*, 32(6), 925-938. <https://doi.org/10.1111/jpim.12163>
- Maree, K. (2007). *First steps in research*. Van Schaik Publishers.
- Mertens, D. M. (2019). *Research and evaluation in education and psychology: Integrating diversity with quantitative, qualitative, and mixed methods*. Sage publications.
- Myers, M. D. (2019). Qualitative research in business and management. *Qualitative research in business and management*, 1-364.
- Nguyen, T.-H., Pham, X.-L., & TU, N. T. T. (2021). The Impact of Design Thinking on Problem Solving and Teamwork Mindset in A Flipped Classroom. *Eurasian Journal of Educational Research*, 96(96), 30-50.
- Oates, B. J., Griffiths, M., & McLean, R. (2022). *Researching information systems and computing*. Sage.
- Pontis, S., & Van der Waarde, K. (2020). Looking for alternatives: challenging assumptions in design education. *She Ji: The Journal of Design, Economics, and Innovation*, 6(2), 228-253.
- Reif, H. L., Clarke, K. E., & Choi, Y. B. Moving Beyond Integrating Ubiquitous Undergraduate Research Skills. Singapore Polytechnic. (2016). *SP's Design Thinking Framework*. Retrieved 28 March 2023 from <http://ejuz.lv/7f3>
- Smiechowski, J., Mercia, M., Kemp, K., Oddone Paolucci, E., Santana, M., & Kachra, R. (2021). Using design-thinking to investigate and improve patient experience. *Patient Experience Journal*, 8(3), 24-44.
- Snoke, R. L. (2004). *Generic attributes of Australian information systems graduates: An empirical study* [Queensland University of Technology].
- Stanford University Design Institute. (n.d.). *The Design Thinking Process*. Retrieved 28 March 2023 from <http://dschool.stanford.edu/our-point-of-view/#design-thinking>
- Stempfle, J., & Badke-Schaub, P. (2002). Thinking in design teams - an analysis of team communication. *Design Studies*, 23(5), 473-496. [https://doi.org/https://doi.org/10.1016/S0142-694X\(02\)00004-2](https://doi.org/https://doi.org/10.1016/S0142-694X(02)00004-2)
- Stock, K. L., Bucar, B., & Vokoun, J. (2018). Walking in another's shoes: Enhancing experiential learning through design thinking. *Management Teaching Review*, 3(3), 221-228.
- Topi, H., Kaiser, K. M., Sipiior, J. C., Valacich, J. S., Nunamaker Jr, J. F., de Vreede, G., & Wright, R. (2010). *Curriculum guidelines for undergraduate degree programs in information systems*. ACM.
- World Economic Forum. (2020). The future of jobs report 2020. Retrieved from Geneva.

Conducting Research in Periences of Interviewing Inside the Metaverse

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Abstract: Recent technological developments in the “Metaverse” have made the immersive virtual reality an imminent reality. Most existing metaverse research focuses on the use case and business potential of the metaverse and virtual reality technologies, but little research has been conducted to understand the experiences of early adopters and the motivators and inhibitors which affect their adoption and continued use. We set out to research the use cases of the metaverse among early adopters. A qualitative approach was employed for research, given its strengths in exploring unforeseen themes and allowing early adopters to raise issues which matter most to them. However, we adopted a novel, albeit entirely appropriate, research methodology which offers possible emulation: our interviews were conducted within a popular metaverse application, *RecRoom*, with semi-structured interviews taking place between avatars. We discovered some interesting differences between interviews in virtual reality, as compared to face-to-face and online interviews, due to the unique affordances of the metaverse. We discuss some of our experiences with interviewing in virtual reality. These include positive experiences which build on the affordances of the virtual reality space; apart from the anonymity (not one’s *real* face), interview participants experienced a greater social presence afforded by gestures indicating emphasis and emotional expressions. However, we also found some potential problems, such as harassment of the researcher and the difficulties with multi-tasking. Alongside capturing metaverse use cases by early adopters at this juncture of metaverse development, our experiences provide some insights and suggestions which might be useful for future metaverse researchers who intend conducting their research with participants while immersed in a virtual reality space.

Keywords: Interviewing in Virtual Reality; VR affordances; Metaverse Research Methods; VR use cases.

1. Introduction

The metaverse can be defined as a “next-generation internet of combined three-dimensional virtual worlds, that can be multiple mirrors of the existent world or fantasy worlds, where avatars can interact with each other and software applications in an immersive, real-time, persistent, shared, spatiotemporal environment, harnessing the capabilities of computing and extended reality (XR) technologies” (Akour et al, 2022; Duan et al, 2021; Huggett, 2019; Nevelsteen, 2017). Virtual worlds are currently considered as the most user-accessible form of the metaverse (Park & Kim, 2022b). Current metaverses use XR, and head-mounted displays (HMDs) are considered an essential component (Park & Kim, 2022a).

The earliest members of the population who begin to use a new technology are often novelty-seeking and defined as innovators or early adopters (Dedehayir et al, 2017). The current users of the metaverse can be categorised as early adopters, given that metaverse technologies have not yet reached the early majority - the release of consumer-friendly Head-Mounted Displays (HMDs) is limited to one or two companies, with few competitors (Diphoko, 2022). The habits of use within this group provide information about the usefulness and interest of emerging technologies within present society, which can be valuable to companies interested in or currently developing these technologies (Sanchez-Cabrero et al, 2018). This group of users play a key role in “communicating or convincing the benefits of the innovation and its uses to the remainder of the population”, aiding the diffusion of innovations (Dedehayir et al, 2017, p. 2). Akour et al (2022) emphasise that the effectiveness of the metaverse is determined by its interactive features and personalised user experience, alongside motivation.

Going forward, there is a likelihood that in-situ qualitative research will have to be conducted within the metaverse or any other virtual reality environments. This paper looks at the affordances of the metaverse from the perspective of a researcher wanting to conduct interviews within the metaverse and reports on our experiences of a research project which we conducted last year.

The overarching research question is: *what are the affordances and pitfalls of using the metaverse to conduct qualitative data collection by means of interviews?* We asked the participants about their experiences in the metaverse as early adopters, as well as *the use cases for which they used the metaverse*. We report briefly on the *metaverse use cases* in this paper (Section 5). However, the focus of the paper is to investigate and report on the added social presence factor which interviewing within the metaverse contributes to research methods (Section 4). Thus the paper’s main contribution is on using interviews in a virtual reality environment as a novel

data collection technique. As highlighted by Kohonen-Aho and Alin (2015, p. 127), “despite a large and growing body of research on social presence, we currently lack a sufficient theoretical understanding of how social presence emerges in 3D virtual environments”. In addition, there is currently little or no research on how to effectively conduct interviews in 3D virtual reality environments. This paper hopes to bring some perspectives on this exciting and potentially very rich environment as a medium in which to collect qualitative research data.

2. Literature Review

1.1 Virtual Reality, Virtual Worlds and the Metaverse

The metaverse can be seen as an integrated or linked collection of virtual worlds “combining immersive Virtual Reality (VR) with physical actors, objects, interfaces and networks in a future form of Internet” (Huggett, 2019, p. 4), becoming a social, virtual world which can parallel the real world. Virtual worlds are attempting to move from a set of sophisticated but independent immersive environments to an immense integrated network, otherwise known as a metaverse (Dionisio, Burns, & Gilbert 2013; Huggett, 2019). Therefore, the core characteristics of virtual worlds extend to metaverse definitions as they connote a subset of metaverse applications. Park & Kim (2022a) clarify the distinction between virtual reality (VR) and augmented reality (AR) technologies and the metaverse. VR technologies are immersive, entirely digital, virtual environments that can be reflections of reality or fantasy worlds (Pengnate, Riggins, & Zhang, 2020). These technologies are a combination of software and hardware – the latter usually requires HMDs, and often uses handheld controls to represent the user’s hands (Carter & Egliston, 2020). AR allows users to experience natural environments with the enhancement of digitally overlaid content and can be experienced using a variety of hardware (Jung et al, 2016). These technologies can also be combined to form mixed reality (MR), and all three of these fall under the category of XR, but AR and VR are considered as the two core reality-virtuality technologies (Xi et al, 2022).

Metaverse has stronger social meanings, and a scalable environment (Park & Kim, 2022a). In order to give users an immersive experience over a longer period, an HMD is necessary, and “XR is the medium which connects avatars in the MV and users in the real world” (Park & Kim, 2022, p. 4211). XR technologies dramatically enhance the immersive, interactive and visual experiences of the metaverse. VR technologies are already becoming increasingly publicly and commercially available with the development of powerful, user-friendly devices such as the Meta (Oculus) Quest 2, HTC Vive, Oculus Rift, Valve Index and PSVR, reinforcing the necessity of these technologies as an essential access point to the metaverse (Jung et al, 2016).

1.2 Current Uses and Affordances of the Metaverse

Stevens (2022) outlines the current affordances of the metaverse: building, exploring and playing in virtual worlds, socialising for work or pleasure, customising avatars, and investing in “virtual property” and NFTs (non-fungible tokens). The competitive landscape for metaverse development is immense, with major companies attempting to become critical players (Mileva, 2022). Hundreds of metaverse platforms and games already exist, with immersive games championed through VR hardware (Mileva, 2022). *Axie Infinity* is currently the most popular metaverse game – it allows users to tokenise Pokémon-like creatures, build worlds for them to live in, and trade them as digital assets (Mileva, 2022). This platform is closely followed *Decentraland*, where digital currency affords users the ability to buy wearables and virtual real estate, as well as the opportunity to earn income (Mileva, 2022). A similar concept is used in *Sandbox* and *Illuvium*, all of which are inspired by the earliest metaverse – *Roblox* (Mileva, 2022). VR platforms have released several 3D social experience games, accessible through constituent XR headsets. *Horizon Worlds* is Meta’s platform, and engages users through interactive games, exploring and creating worlds, and socialising with other users (Sharma, 2022). *VRChat*, *RecRoom*, and *Fortnite* use the same format, and collectively attract more than 171 million users (Petrov, 2022). Many of these platforms are also available on smartphones, consoles and PCs.

1.3 Interviewing: Comparing Physical with Online (Electronic) Interviews

Face-to-face (FTF) interviewing has strengths in providing rich data quality as a result of more conscientious participants, non-verbal cues, and human contact (Schober, 2018). However, as standards of communication are changing rapidly with the development of technology, alongside people’s perceptions of these technologies, modes of interview are evolving based on practicality, preference, and effectiveness in relation to desired data collection outcomes. FTF interviews now compete with the popular medium of video-chat (VC) or online interviews, with clear advantages and disadvantages respectively. This study introduces a novel research

methodology, interviewing participants avatar-to-avatar (**ATA**) in a virtual world, using the affordances of the three-dimensional metaverse.

The literature exploring and comparing interviewing modes primarily focuses on the workplace context and performance, but nevertheless the findings have implications which extend to field research. Insofar as the researchers have surveyed literature, there is no information considering the benefits or drawbacks of interviewing within the metaverse – instead, the possible benefits or drawbacks have been extrapolated based on comparisons between the affordances of FTF and VC in relation to ATA.

FTF interviews allow interviewers to encourage participation while having more certainty that interviewees fit within their sampling frame, owed to the certainty regarding location and identity (Schober, 2018). In contrast, while VC provides less certainty, it is a much more cost-effective solution than FTF interviews, and affords ease of geographically dispersed study (Sears et al, 2013). VC interviews can be scheduled with more convenience for both parties, and can be undertaken in greater volumes due to affordances of digital data collection which aids efficiency (Sears et al, 2013; Schober, 2018). However, people have differing levels of technological capability, which may exclude potential participants if they do not have familiarity with or access to video chat platforms (Sears et al, 2013). Moreover, in an increasingly ‘online’ environment, potential participants may be excluded based on their preference of being interviewed – some may not want to meet FTF based on their schedule, social anxiety, fears regarding safety, or lack of desire – to share their personal space with a stranger. The advantages and considerations regarding VC undoubtedly apply to ATA, but the disadvantage of technological capability may be heightened considering the lack of adoption of virtual reality in comparison to VC. Covid-19 has undoubtedly encouraged the adoption of and reliance on online communication. With people increasingly working remotely, they may question the need for an in-person meeting as societal norms have made online meetings a default option. However, potential participants may not have the means or capability to participate in virtual reality interviews, making ATA more suited to sampling frames with the pre-requisite of regular VR use.

FTF interviewers can create more incentives for participation, and provide the ‘human touch’ that motivates participants to answer conscientiously, and disclose more sensitive information (Schober, 2018). It provides less suspicion about the interview process, and higher tolerance of interview length, which Sears et al (2013) attribute to the increased “likeability” of interviewers in real-life settings and heightened perceptions regarding their effectiveness (Schober, 2018). FTF interviews encourage honesty in answering non-sensitive questions, as evidenced by the decreased likelihood of participants giving socially desirable answers and increased likelihood of opinion-based responses (Schober, 2018). With concerns regarding data privacy as technologies become ubiquitous with everyday decision-making, VC or online interviews may prohibit interviewees from expressing opinions which are not socially acceptable, for fear that any online presence is vulnerable to third-party access (Basch et al, 2020).

However, Schober (2018) additionally points out that participants may be more comfortable giving sensitive answers because of the protection of technology afforded by VC, given that they have more control (e.g. choosing what part of their environment to share, choosing to switch to audio-only). Especially with audio-only options, participants may be more comfortable in line with well-established social forms of the confessional booth and psychoanalytic couch which remove the face to allow for greater disclosure (Schober, 2018). The self-awareness provided by the self-view in VC may result in distraction of the interviewee, or may make them more self-conscious and less vulnerable in providing responses (Schober, 2018; Sears et al, 2013).

ATA provides an interesting middle ground, where the benefits of ‘virtual human touch’ are higher than VC and can arguably create similar advantages of conscientious answers and likeability of interviewers. Moreover, privacy concerns of VC may be mitigated, as participants might not be required to provide real names, faces, or voices in ATA research, perhaps allowing participants to give more honest and genuine answers than in VC or FTF without fear of judgement or later repercussions. Moreover, ATA does not require “self-view” – in video chatting platforms, the interviewee can often see themselves in a small corner frame, making them conscious of their perceived appearance. ATA gives ultimate control over perception and potential bias, because interviewees can present themselves in any way they choose.

Significantly, FTF interviews give rich non-verbal cues, both in participant displays and in their environment. This allows interviewers to make adjustments in real-time as they gauge participants’ emotional state, facilitating longer interviews, encouraging completion, and reducing distractions (Schober, 2018). These affordances are especially pronounced when considering the dependence of VC interviews on reliable bandwidth, which can impair the reading and quality of non-verbal cues for the researcher (Basch et al, 2021). Moreover, researchers can only see what the interviewee decides to share, as they are removed from participants physical

environments and restricted to a view of their head and torso – non-verbal cues are limited by this perspective (Kohonen-Aho & Alin, 2015; Sears et al, 2013).

Again, ATA provides a middle ground – non-verbal cues are enhanced by the ability to see the entire body and its gestures, but simplified faces and forms may limit these cues to a specific range. Moreover, the discomfort of VR headsets may limit the amount of time interviewees can spend in the interview, as the cognitive load is much greater. Kohonen-Aho & Alin (2015) highlight that this limited non-verbal cues may be an advantage in interpretive research, as researchers do not always reliably interpret individuals’ reactions; online interviews using VC or ATA could reduce the conscious and sub-conscious interpersonal judgements of researchers while still providing some real-time opportunities to probe for further information based on verbal and limited non-verbal cues (Sears et al, 2013). With that said, unstable bandwidth, lack of clarity and dropped signals could result in frustrations which could negatively affect engagement on both the side of the interviewer, and of the interviewee in online interviews, or cause participants to withdraw entirely from research.

The advantages and disadvantages of different interview modes are summarised in the table below. The choice of interview mode based on these affordances heavily relies on the unique features and requirements of the research, such as subject matter, sensitivity of study, available resources and sampling frame.

Table 1: Strengths/weaknesses of different interview modes

Face-to-face / Physical	Online / Electronic	Virtual Reality / Avatar-to-Avatar
More certainty of adherence to sampling frame	Less certainty of adherence to sampling frame and increase reliance on participant honesty	Anonymity requires complete reliance on participant honesty for adherence to sampling frame
Expensive	Very cost-effective	Can be cost-effective depending on need to acquire headsets
Limited by physical reach of researchers to participants	Geographically dispersed participants	Geographically dispersed participants
No need for technological capability or means to participate	Need for technological capability and means to participate (bandwidth, devices etc.)	Advanced need for technological capability and means to participate (bandwidth, devices etc.)
Answer non-sensitive questions more conscientiously and fully	Answer non-sensitive questions less conscientiously and fully	Unclear
Less privacy concerns	More privacy concerns	Anonymity; least privacy concerns
Less control	More control	Most control
More potential for subjectivity by researcher	Less potential for subjectivity by researcher	Least potential for subjectivity by researcher
Rich non-verbal cues	Less rich non-verbal cues	Non-verbal cues within specific range

Schober et al (2018) argue that although FTF interviews are no longer considered as the most desirable form of data collection, owed to the adoption of new communication modes and the cost-effectiveness of these solutions, participants may always prefer the ‘human touch’ of social presence and rapport with interviewers. Social presence connotes the extent to which users feel or perceive the presence of others, and their ability to access the intelligence, intentions and sensory impressions of one another (Pengante, Riggins & Zhang, 2020; Oh, Bailenson & Welch, 2018). Although VC improves social presence through video feeds, it does not provide a feeling of shared space in the same capacity as FTF.

Kohonen-Aho & Alin (2015, p. 114) highlight that VR could be considered as a “potential solution for the lack of social presence caused by the distance allowed by the communication medium”. This potential solution was also highlighted by Zuckerberg himself (Meta, 2021), noting that “when you’re in a meeting in the metaverse, it’ll feel like you’re right in the room together, making eye contact, having a shared sense of space and not just looking at a grid of faces on a screen”. This heightened level of social presence reduces distance caused by the communication medium through a shared sense of space, which prevent users from becoming disengaged. Moreover, the heightened level of social presence afforded by ATA undoubtedly affects engagement and comfort of users, which may allow for richer responses and prompts (Pengante, Riggins & Zhang, 2020). ATA arguably harnesses the individual benefits of FTF (social presence, likeability of interviewer, comfort, non-verbal cues) and VC (greater accessibility of participants, control, lessened bias) to create a solution which does not require as much compromise from researchers. Moreover, the affordance of anonymity in ATA interviews is only poised to become more significant as privacy concerns proliferate alongside the adoption of technologies.

3. Research Methodology

There were two research objectives for this research. The main research objective was to look at *the use cases and experiences of the early adopters in the metaverse*. In order to achieve this, interviews were conducted inside the metaverse between avatars, and this led to a second research question: “*how can the affordances and limitations of the metaverse be used effectively to conduct qualitative data collection?*”. The first objective is reported on in much more depth elsewhere but summary findings relating to the use cases, are highlighted in Section 5. The findings relating to the use of the metaverse as a medium to collect data are found in Section 4.

Considering that this research aims to understand the thoughts and actions of human participants in the metaverse context, the interpretivist philosophy was adopted. When applied to information system field research, it strives to understand context and the process whereby the information system is influenced and influences the context (Klein & Myers, 1999). Moreover, it is the only philosophy which encourages the researcher to be an insider to better understand the data, making it suitable for interviews within the metaverse which may be influenced by the social presence of the researcher’s avatar (Lacity & Janson, 1994). Taking these principles into account, this research will create knowledge through analysing the experiences of early adopters, providing a richer understanding of the metaverse context alongside its influence on users and the influence of users on the platform. Given the research questions of this study, and the interpretivist nature of the research, the purpose is exploratory. Exploratory research is especially useful in new areas of inquiry, where the goals of the research are to understand the extent of a particular phenomenon, problem or behaviour, or to generate some initial ideas about that phenomenon (Bhattacharjee, 2012). The metaverse is a rapidly developing concept, and while ample research exists regarding the accessing of XR technologies, the phenomenon of how to interview for research purposes in the Metaverse has not been extensively researched, making it suited to exploratory research.

The cross-sectional timeframe, which collects all data at one point in time, is well-suited to research in and with fast-developing emerging technologies. Given the rapidly changing metaverse landscape, a longitudinal study might provide contradictions in sets of data as technologies are continuously modified. The research proposal and instruments were approved by the Ethics in Research Committee at the University, to ensure the study was in line with the laws and rights of individuals with regard to research that involves human participants.

4. Interviewing in the Metaverse as a Means for Qualitative Data Collection: An Experiential Report

This section details our experiences with interviewing in a virtual reality space. The interviewing researcher began to field interviews purposively by means of posting a short description of the study and a request for participants on *RecRoom* adult forums, outlining the entirely voluntary nature of the study. Purposive sampling was important given the reliance of interviewing in the metaverse on technological capability and means to participate. Individuals approached the researcher using private messaging affordances of the platforms, and if they met the inclusion criteria as defined by the target population, interviews were set up with times and virtual meeting locations. Interviews commenced from the beginning of June. The researcher entered *RecRoom*, a free online virtual world which is predicted to become one of the biggest players in the metaverse (Sherr, 2021), using an Oculus Quest 2 virtual reality headset. Interviews were conducted by means of using the researcher’s avatar, named *technosavvy*, to communicate with the participant avatar, in a virtual face-to-face fashion (Figure 1). The researcher’s avatar resembled the researcher.



Figure 1: Example of Data Collection Method

The researcher requested consent to record, and upon receiving consent, the recording of the interaction commenced aided by the screen recording functionality of the headset. The researcher then read out the consent paragraph defining the informed consent and requested verbal confirmation of consent from the interviewee. Participation was solely voluntary and based on the interest of the participants in the research. Once informed consent had been obtained from each interviewee, the researcher commenced the semi-structured interview using the interview guide. These interviews ranged in length from 20 to 60 minutes. The demographic details of participants are highlighted in **Table 2**, alongside their accessing technologies and when they began using the metaverse. Interviews were recorded, transcribed and securely stored. Immediately after interviews the researcher took down notes or observations as they related to the interview, given that these notes could not be taken during interviewing because of the immersive head-mounted display hardware.

Table 1: Demographic Participant Information

Participant	Age	Gender	Accessing Technology	First Adoption (Date)
P1	45	Man	Oculus Quest 2	June 2020
P2	51	Man	Oculus Quest 2	May 2022
P3	-	Man	Oculus Quest 2	May 2019
P4	50	Man	Oculus Quest 1	January 2020
P5	40	Man	Oculus Quest 2	2019
P6	50+	Woman	Oculus Quest 2	January 2021
P7	45-50	Woman	Oculus Quest 2	November 2021
P8	-	Woman	Oculus Quest 2	February 2022

In developing this study, a novel research technique was used – interviewing between avatars in the metaverse. For future researchers interested in implementing this technique, the researcher recommends considering the various advantages and disadvantages of this technique. First, when participants responded to questions, the affordances of social presence made their responses rich with gestural nuances. Emphasis and emotion could be expressed through hand and head movements, and travelling around the room demonstrated when users got restless. Alongside highlighting the varied significance or certainty of their responses, which aided in analysis, it also allowed the researcher to understand when to prompt for more information using further questions in the semi-structured interview. However, these non-verbal gestures and expressions were limited by the range of emotions and movements afforded to *RecRoom* avatars. Nevertheless, participants appreciated the affordances of social presence based on researchers' affirming gestures, such as nodding their head or shaking hands when greeting them. Moreover, it allowed participants to demonstrate the motivators or inhibitors which they highlighted, through 'teleporting' with the researcher to those spaces or showing virtual items.

Interviewing in the metaverse meant the benefits of erasing barriers, such as appearance, could be applied to the objectivity of the research. Responses were not subconsciously influenced by these barriers, and therefore participant experiences were analysed based wholly on their content. Additionally, it is possible that the affordance of not being observed allowed participants to be more comfortable, which may have resulted in more honest responses, as they were being interviewed in a space which felt safe to them. Although none of the participants exercised the affordance of control through leaving the interview, this ability may have catalysed their willingness to participate, knowing they could withdraw at any time, without fear of social pressure, through teleportation.

Immersion in the space also allowed the researcher to more deeply understand the benefits and struggles users experienced in the metaverse, especially in relation to harassment and multitasking. When initially randomly attempting to sample participants through approaching avatars in public rooms, the researcher's avatar was harassed by a younger player who wanted to engage in a virtual fight, and continuously insulted the researcher through voice chat affordances. There was difficulty reading interview questions while wearing the headset, and there were no options to bring information from devices into the metaverse, which meant the researchers had to use the private messaging functionality to send the questions as messages to a friend in *RecRoom* (**Figure 2**). In this way, the messages could be viewed whilst interviewing the other avatar, although this was far from an ideal solution. The headset caused physical strain for the researcher, both in discomfort while wearing the headset as it pressed against the face causing imprint given its heaviness, and in strain on the eyes during longer interviews. However, this did not seem to be an issue for early adopters – many of them expressed their ability to wear the headset for long periods of time.



Figure 2: Example of Limitation in Data Collection Method

Moreover, when considering the geographic dispersion of metaverse users, researchers must pay close attention to ethics. This study demonstrated the difficulty of finding research participants within one area, given the inherent diversity of virtual social spaces. To ethically conduct research within these spaces, researchers must consider universal ethical standards. Additionally, given that academia has a responsibility to instruct on the development of the metaverse (Akour et al, 2022), they must also put forward suggestions for systems of virtual ethics which encompass global ethical standards.

5. Use Cases of the Metaverse

Most of the use cases identified in the literature review were identified as motivators by participants – gaming, user-generated content (UGC), education, fitness and investment (commerce). However, these use cases were enhanced through identified motivators on the platform, such as socialisation, immersion and extended abilities, and were all identified as hedonic motivators for use of the metaverse. A more detailed description of the use cases had to be omitted due to space limitations.

Table 2: Use Cases and Occurrences Amongst Participants

Use Cases	P1	P2	P3	P4	P5	P6	P7	P8	Total
Gaming	X	X	X	X	X	X	X	X	8
UGC	O	O	X	X	X	X	O	X	5
Learning	O	O	X	O	X	X	O	X	4
Fitness	O	O	O	X	O	X	O	X	3
Investment	O	O	O	O	X	O	O	O	1

6. Conclusion

Although the idea of the metaverse has been around since the publication of Stephenson's (1992) sci-fi novel thirty years ago, it's only recently that technological developments have made this immersive landscape an imminent reality. Investments from the Global North in the Web3 XR space are substantial, and the competitive landscape is growing as the broadness of use cases is motivating users to invest in and adopt the technology (Xi et al, 2022). When conducting this research project last year, the aim was to understand the affordances of the metaverse through interviewing early adopters to uncover popular use cases. In doing so, the researchers demonstrated a novel research technique – interviewing between avatars (ATA) in the metaverse. The primary research question in this paper was to explore the affordances and pitfalls of qualitative data collection of ATA interviewing in the metaverse, and to provide recommendations and inspiration to future researchers with similar research methodologies.

Early adopters were gratified by the broad use cases of the metaverse, and many pointed to gaming as an exceptional source of fun and pleasure, given its aspects of competitiveness and socialisation. The benefits of user-generated content unexpectedly emerged as a strong hedonic motivator, and overlapped with the educational advantages of the platform. Learning was revived in metaverse use cases, given how the metaverse creates the affordance of visualising concepts and enhanced demonstration capabilities, amplified by the advantages of presence for teaching. Fitness emerged as a more distinctive use case in the metaverse

and had life-changing effects for one participant. Additionally, the unique experience of novel investment in virtual real estate was highlighted, which demonstrated the future of the metaverse. The outlined popular use cases among participants, contextualise the current state of metaverse development, and give insight into elements for further development. The affordance of 'teleporting' to environments and demonstration of virtual items through interviewing in the virtual space enriched the researchers' understanding of these use cases.

In discussing the researchers' experience of the novel research technique of ATA interviewing, the affordance of social presence enriched participant responses through non-verbal cues. Although limited to a certain range, avatar body movements and facial expressions highlighted emphasis and emotion, which aided analysis in allowing the researcher to understand the certainty or significance of responses and when to deviate from the structured research instrument to probe for further information. Participants similarly appreciated the richness of social presence through the researchers' affirming gestures, such as nodding of the head or shaking hands, which made them feel a shared sense of space similar to Zuckerberg's (Meta, 2021) proclamations.

Interviewing in the metaverse had significant implications for critical issues of ethicality and objectivity in qualitative and interpretive research (Klein & Myers, 1999). Given the anonymity of avatars in the metaverse, researchers were not subconsciously influenced by appearance, allowing experiences to be analysed wholly on their content. Coupled with this anonymity, the participants were able to interview in a comfortable and familiar space, without being watched or watching themselves, possibly resulting in more honest, full and genuine responses. Moreover, they had ease of withdrawing from the research at any time through 'teleportation'. However, the geographic dispersion of users of the metaverse calls on academia to develop a universal standard for ethical research in VR, given that limiting research participants to one physical area is challenging.

Researchers interested in interviewing in the metaverse have to consider the limitations of multi-tasking, harassment, and physical strain of the headset when considering ATA interviewing. Nevertheless, the novel qualitative research technique combines the affordances and addresses the shortcomings of FTF and VC, providing an opportunity to contribute to academic research in a more socially present, meaningful way for both researchers and participants.

References

- Akour, I., Al-Marouf, R. S., Alfaisal, R., and Salloum, S. A. (2022) "A Conceptual Framework for Determining Metaverse Adoption in Higher Institutions of Gulf Area: An Empirical Study using SEM-ANN Approach", *Computers and Education: Artificial Intelligence*, pp 1-14.
- Basch, J. M., Melchers, K.G., Kurz, A., Krieger, M. and Miller, L. (2020) "It Takes More Than A Good Camera: Which Factors Contribute to the Differences Between Face-to-Face Interviews and Videoconference Interviews Regarding Performance Ratings and Interviewee Perceptions?", *Journal of Business and Psychology*, Vol. 36, pp 921-940.
- Bhattacharjee, A. (2012) *Social Science Research: Principles, Methods, and Practices*, University of South Florida, Tampa.
- Carter, M., and Egliston, B. (2020) *Ethical Implications of Emerging Mixed Reality Technologies*, University of Sydney, Sydney.
- Dedehayir, O., Ortt, R. J., Riverola, C., and Miralles, F. (2017) "Innovators and Early Adopters in the Diffusion of Innovations: A Literature Review", *International Journal of Innovation Management*, Vol. 21, No. 8, pp. 1-27.
- Dionisio, J. D., Burns, W. G., and Gilbert, R. (2013) "3D Virtual Worlds and the Metaverse: Current Status and Future Possibilities", *ACM Computing Surveys*, Vol. 45, No. 3, pp. 1-38.
- Diphoko, W. (2022) "The State of the Metaverse According to Zuck", [online], FastCompany, <https://www.fastcompany.co.za/technology/the-state-of-the-metaverse-according-to-zuck>
- Duan, H., Li, J., Fan, S., Lin, Z., Wu, X., and Cai, W. (2021) "Metaverse for Social Good: A University Campus Prototype", *ACM International Conference on Multimedia*, Virtual Event, Cornell University, pp. 153-161.
- Halaweh, M. (2019) "Model of Emerging Technology Adoption (META): Virtual Reality as a Case Study", *Journal of Information & Knowledge Management*, Vol. 18, No.(2), pp. 1-18.
- Huggett, J. (2019) "Virtually Real or Really Virtual: Towards a Heritage Metaverse?", *Studies in Digital Heritage*, Vol. 4, No. 1, pp. 1-15.
- Jung, T., Dieck, M. C., Lee, H., and Chung, N. (2016) "Effects of Virtual Reality and Augmented Reality on Visitor Experiences in a Museum", *Information and Communication Technologies in Tourism 2016*, pp. 621-635.
- Klein, H., and Myers, M. (1999) "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems", *MIS Quarterly*, pp. 67-94.
- Kohonen-Aho, L. and Alin, P. (2015) "Introducing a Video-Based Strategy for Theorizing Social Presence Emergence in 3D Virtual Environments", *Presence*, Vol. 24, No. 2, pp. 113-131.
- Lacity, M., and Janson, M. (1994) "Understanding Qualitative Data: A Framework of Text Analysis Methods", *Journal of Management Information Systems*, pp. 137-155.

- Meta. (2021) "The Metaverse and How We'll Build It Together - Connect 2021", [online], Meta, <https://www.youtube.com/watch?v=Uvufun6xer8>
- Mileva, G. (2022) "50+ Metaverse Statistics | Market Size & Growth", [online], Influencer Marketing Hub, <https://influencermarketinghub.com/metaverse-stats/>
- Nevelsteen, K. J. (2017) "Virtual World, Defined From A Technological Perspective and Applied to Video Games, Mixed Reality, and the Metaverse", *Computer Animation in Virtual Worlds*, pp. 1-22.
- Oh, C., Bailenson, J., and Welch, G. (2018) "A Systematic Review of Social Presence: Definition, Antecedents, and Implications", *Frontiers in Robotics and AI*, Vol. 5, No. 114, pp. 1-35.
- Park, S., and Kim, S. (2022a) "A Metaverse: Taxonomy, Components, Applications and Open Challenges", *IEEE Access*, pp. 4209-4251.
- Park, S., and Kim, S. (2022b) "Identifying World Types to Deliver Gameful Experiences for Sustainable Learning in the Metaverse", *Sustainability*, pp. 1-14.
- Pengnate, S., Riggins, F., and Zhang, L. (2020) "Understanding Users' Engagement and Responses in 3D Virtual Reality: The Influence of Presence on User Value", *Interacting with Computers*, Vol. 32, No. 2, pp. 103-117.
- Petrov, C. (2022) "45 Virtual Reality Statistics That Will Rock the Market in 2022", [online], Techjury, <https://techjury.net/blog/virtual-reality-statistics/#gref>
- Ramayah, T., Rabaya, T., Saparya, S., Mahmud, I., and Rawshon, S. (2017) "Why Are They So Addicted?: Modeling Online Games Addiction Behaviour Among University Students", 1st International Conference on Business & Management, ResearchGate, pp. 1-7.
- Sanchez-Cabrero, R., Costa-Roman, O., Pericacho-Gomez, F. J., Novillo-Lopez, M. A., Arigita-Garcia, A., and Barrientos-Fernandez, A. (2019) "Early Virtual Reality Adopters in Spain: Sociodemographic Profile and Interest in the Use of Virtual Reality as a Learning Tool", *Heliyon*, Vol. 5, No. 3, pp. 1-12.
- Schober, M. F. (2018) "The Future of Face-to-Face Interviewing", *Quality Assurance in Education*, Vol. 26, No. 2, pp. 290-302.
- Sears, G., Zhang, H., Wiesner, W., Hackett, R., and Yuan, Y. (2013) "A Comparative Assessment of Videoconference and Face-to-Face Employment Interviews", *Management Decision*, Vol. 51, No. 8, pp. 1733-1752.
- Sharma, U. (2022) "10 Best Metaverse Games to Play", Beebom, <https://beebom.com/best-metaverse-games/>
- Spiegel, J. (2018) "The Ethics of Virtual Reality Technology: Social Hazards and Public Policy Recommendations", *Science and Engineering Ethics*, Vol. 24, pp. 1537-1550.
- Sherr, I. (2021). "Rec Room's Big Plans for the Metaverse: 'So Much More Than A Game'", [online], Cnet, <https://www.cnet.com/tech/gaming/rec-rooms-big-plans-for-the-metaverse-so-much-more-than-a-game/>
- Stephenson, N. (1992) *Snow Crash*, Bantam Books, New York.
- Stevens, R. (2022). "What can you actually do in the Metaverse in 2022?", [online], CoinDesk, <https://www.coindesk.com/learn/what-can-you-actually-do-in-the-metaverse-in-2022/>
- Tasa, U. B., and Gorgulu, T. (2010) "Meta-art: Art of the 3D User-Created Virtual Worlds", *Digital Creativity*, Vol. 21, No. 2, pp. 100-111.
- Xi, N., Chen, J., Gama, F., Riar, M., and Hamari, J. (2022) "The Challenges of Entering the Metaverse: An Experiment on the Effect of Extended Reality on Workload", *Information Systems Frontiers*, pp. 1-22.

Do Researchers Practice what they Preach? An Empirical Analysis of Evaluation Criteria

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Abstract: In our project, we take part in the debate about evaluation criteria in qualitative management and organisational science (MOS) research. Since the use of quantitative research criteria to evaluate qualitative research, as well as specific theoretically derived qualitative criteria, has been criticised, we look at this topic from an empirical perspective. Based on a comprehensive analysis of 449 articles published from 2011 to 2021 in five top-tier MOS-journals (Academy of Management Journal, Administrative Science Quarterly, Journal of Management, Organization Science, Strategic Management Journal), we analyse how researchers address the issues of rigor and quality. Focusing on the most common evaluation criteria in the articles (validity and trustworthiness), our results indicate that scholars use qualitative evaluation criteria in a pragmatic way. This shows that, in contrast to the epistemological and methodological differences in theoretically derived evaluation criteria, researchers apply similar techniques to ensure validity and trustworthiness. Given that we only had access to published articles demonstrating the state of the art of using evaluation criteria, the current use of evaluation criteria during the research process remains a 'black box.' Therefore, to uncover such implicit evaluation criteria, we suggest a follow-up interview study to gain a deeper understanding of this relevant 'black box'. In doing so, we aim to explore the intentions and experiences of authors who published qualitative research in top-tier journals on the question, "How to deal with evaluation criteria in research practice as well as during the review process?". As publishing articles in leading journals is very competitive, we argue that these criteria are mainly the outcome of institutional practices, such as the review process and editorial policies. Our follow-up interview study proposes a way to shed light not only on the explicitly mentioned criteria in published articles but also on the underlying implicit criteria in-use during the research process up to publication.

Keywords: qualitative research, evaluation criteria, methodology, rigor, quality

1. Evaluation criteria in qualitative research

Despite the traditional and still dominant approaches of quantitative research within management and organisation studies (Duberley, Johnson and Cassell, 2012), the number of qualitative articles published in leading international journals in business and management has grown over the past decades (Bluhm et al., 2011; Thelwall and Nevill, 2021). This indicates the acknowledgement of qualitative research methods to study relevant issues in management and organisational science (MOS) and shows that qualitative research is accepted as a valuable and valid research approach within the MOS community (Prasad and Prasad, 2002; Cassell and Symon, 2006; Bansal and Corley, 2011). There may also no longer be any differences between quantitative and qualitative research in terms of the chances of getting one's work published (Cornelissen, 2017). However, according to Bonache (2020), there are still some challenges to overcome during the review process, especially with regard to evaluation criteria for qualitative studies.

In 1985, Lincoln and Guba (1985, p. 290) raised the question, "How can an inquirer persuade his or her audiences that the research findings of an inquiry are worth paying attention to?". Since then, researchers have offered valuable insights regarding the quality of qualitative studies (e.g. Johnson et al., 2006; Maxwell, 1992; Tracy, 2010). Despite suggestions to use quantitative evaluation criteria for qualitative studies (e.g. Kirk and Miller 1986), due to the nature of social reality as well as the philosophical differences between quantitative ('erklaeren') and qualitative ('verstehen') inquiry (Duberley, Johnson and Cassell, 2012; Yilmaz, 2013), researchers have claimed that the traditional criteria used to evaluate a quantitative study are not applicable for qualitative research (Easterby-Smith, Golden-Biddle and Locke, 2008). Therefore, scholars such as Lincoln and Guba (1985) and Tracy (2010) proposed specific criteria to evaluate qualitative research regarding its epistemological and ontological characteristics. Instead of such 'one-size-fits-all' solutions (Johnson et al., 2006), Johnson (2015, p. 320) calls for a "more permissive, pluralistic and reflexive approach to research evaluation". Following this line of thought, there have been initial attempts to investigate this issue empirically.

Pratt (2008) surveyed authors who published a qualitative study in at least one top-tier North American journal (*Academy of Management Journal*, *Administrative Science Quarterly*, *Organization Science*, or *Strategic Management Journal*) to investigate which evaluative dimensions were used. Pratt's study indicates that researchers' experiences regarding qualitative evaluation criteria focus on three areas of tension: "(a) the need

to both break away from and be firmly embedded in extant theory; (b) the need to both provide enough data so that a reader can draw conclusions, while also providing enough interpretation of that data; and (c) the need to be both detailed and transparent with regard to one's methods, while also fitting one's research into the format of a top-tier North American journal" (p. 485). Pratt (2008, p. 495) describes these tensions metaphorically as "fitting oval pegs into round holes".

Based on published articles in two International Business (IB) journals (*Journal of International Business Studies* and *Journal of World Business*), three expert interviews, and sample reviews, Welch and Piekkari (2017) analysed what the IB-scholarly community considers as 'good' qualitative research. As an alternative to the rigid application of a single set of qualitative evaluation criteria and procedures, they argue for a more pluralistic, contextual approach that reflects the inherent characteristics of IB as a research field.

Drawing on these two studies, which examined the requirements that evaluation criteria must meet to assess rigor and quality in qualitative studies, we go a step further by exploring the use of concrete evaluation criteria. However, to the best of our knowledge, no empirical studies have investigated what qualitative evaluation criteria researchers use to ensure rigor and quality in journal articles. Therefore, our research project aims to contribute to the growing literature on empirically derived qualitative evaluation criteria, which we have briefly reviewed. Specifically, we aim to answer the question of how qualitative researchers use evaluation criteria within a peer-reviewed MOS journal article, as it is considered the most important medium for high-quality science communication (Huff, 1999).

Our research project has the potential to make several contributions to the field. First, it can help develop a more nuanced understanding about the role of evaluation criteria in qualitative management research. By examining the ways in which researchers report on such criteria, our project can shed light on the various ways in which criteria are employed and their relative importance in assessing the quality of qualitative research. This may help advance our understanding about the philosophical assumptions of qualitative research and the underlying criteria. Second, our research project potentially contributes to both the development and the use of best practices of evaluation criteria in qualitative research. This can lead to an improvement in the rigor and quality of qualitative studies. Third, our project can also help to establish qualitative methods as a rigorous and respected research method, which can contribute to its wider acceptance and integration into various research fields. Overall, our research project has the potential to make a significant contribution to the advancement of qualitative research methodology and its broader impact in the academic community.

2. Method

2.1 Sample

Our sample included articles published in five top-tier MOS-journals. Specifically, we focused on the *Academy of Management Journal (AMJ)*, *Administrative Science Quarterly (ASQ)*, the *Journal of Management (JOM)*, *Organization Science (ORSC)*, and the *Strategic Management Journal (SMJ)*. These journals are consistently ranked as top journals in the field (Podsakoff et al., 2008) and are highly influential (Pratt, 2008; Scandura and Williams, 2000). Moreover, previous studies have used these journals to identify the critical evaluative dimensions necessary for publishing an academic article (Pratt, 2008) and to address self-reported limitations and future research directions found within the articles (Brutus, Aguinis and Wassmer, 2013). Our sampling process focused on empirical contributions using only qualitative methods and data. We analysed all articles from 2011 to 2021. Our final sample included 449 articles: 155 *AMJ*, 74 *ASQ*, 14 *JOM*, 156 *ORSC*, 50 *SMJ*.

2.2 Coding Procedures

In the first step, we coded each article to assess the research approach. The research approach was determined from the reported methodology, data collection methods, and procedure of analysis. Therefore, we coded each article on the following research approaches: narrative research, phenomenology, grounded theory, ethnography, and case study (Creswell and Creswell, 2018).

In the second step, to code the evaluation criteria, we conducted a narrative literature search on theoretically derived evaluation criteria. Given that case study, ethnography, and grounded theory are the most common used research approaches in the articles analysed, we focused not only on universalistic evaluation criteria but also on theoretically derived criteria specified in case study, ethnography, and grounded theory to link the

evaluation criteria with philosophical assumptions. We included evaluation criteria from the following sources in our coding scheme.

- Universalistic: Lincoln and Guba (1985); Maxwell (1992); Altheide and Johnson (1994); Whitemore, Chase and Mandle (2001); Tracy (2010); Miles, Huberman and Saldaña (2020)
- Case study: Eisenhardt (1989); Yin (1994/2018); Klein and Myers (1999)
- Ethnography: Golden-Biddle and Locke (1993); Hess (2001)
- Grounded theory: Corbin and Strauss (1990); Locke (2001); Charmaz (2006/2014)

3. Results

Validity and trustworthiness were the most commonly used evaluation criteria in the journal articles analysed. While a variety of evaluation criteria were mentioned, in the following, we focus on these two criteria to provide detailed insights.

3.1 Validity

Our analysis showed that the empirically derived understanding of validity represents an umbrella term including different techniques in data sources, findings, interpretations, and the context of generalisability. To ensure the validity of data sources, many authors used data triangulation. For example, in their case study, Helms and Patterson (2014) triangulated interviews and observations with archival data. Monin et al. (2013, p. 264) mentioned that “qualitative process analysis involves methodological challenges related to validity”. To deal with it, they had regular meetings with the companies they analysed to discuss and validate their findings. This kind of member check to ensure validity was discussed in many papers as a validity check. In another case study, Ozcan and Gurses (2018, p. 1795) “did a final validity check by conducting retrospective interviews with two prominent actors who played a fundamental role”. In addition to such member checks, Ravasi, Rindova and Stigliani (2019) discussed their findings, based on combined procedures for grounded theory and multiple-case study, with colleagues as peer debriefing to check the validity of their interpretations. Addressing validity in data analysis and interpretation is not only found in case studies, but also in ethnographic research. To increase the validity of their findings, Kremser and Blagoev (2021) conducted “an insider-outsider approach to data analysis [...], whereby the first author assumed the role of a neutral outsider who interrogated and critically questioned the second author’s initial interpretations of the data as well as emerging theoretical ideas”. In another ethnographic study from De Rond and Lok (2016), “the co-author played an important reflexive role by actively questioning the validity of emerging insights in ongoing discussions about data interpretation and theory development.”

3.2 Trustworthiness

Lincoln and Guba (1985) suggested four criteria to achieve trustworthiness. To ensure credibility, a commonly used technique was triangulation. While Caza, Moss and Vough (2018) used multiple sources of data to increase the trustworthiness of their findings by following a grounded theory approach, Wright, Zammuto and Liesch (2017, p. 214), who conducted a case study, “compared iteratively within and between [their] different sources of data and [their] emergent categories and challenged each other’s perspectives to arrive at the most credible interpretation of our data”. The most commonly used technique to increase trustworthiness in general, and credibility in particular, was member checks. In their case study, Ben-Menahem et al. (2016, p. 1316) “discussed [their] emerging model with several key informants” and Danneels (2011, p. 4) “exchanged emails with some of the interviewees” to confirm his interpretations of a historical case. According to Lincoln and Guba (1985), Garg and Eisenhardt (2017, p. 1835), who conducted a multiple-case study, “engaged in peer debriefing with colleagues”. Transferability was mentioned in grounded theory articles. While Harrison and Rouse (2014, p. 1278) focused “on describing how [their] context is similar to others in order to allow for transferability”, Schinoff, Ashforth and Corley (2020, p. 1418) described “the unique characteristics of [their] sample”. An illustration of a dependability audit was given by Harvey and Kou (2013, p. 355), who also followed a grounded theory approach: “the second author, who had not been involved in coding at that point, was trained in using the coding scheme and performed two reliability checks”. To ensure confirmability, in his case study, Carton (2018, p. 334) “asked six scholars who publish inductive research in top management journals to audit the data presented in the paper as well as [his] interpretations of them to check the coherence of the theoretical model”.

4. Discussion

Our study focused on criteria to evaluate qualitative research in five journals in the MOS field (AMJ, ASQ, JOM, ORSC, SMJ). All 449 articles analysed contained evaluation criteria. To gain detailed insights into best practices, we focused on the two most commonly used criteria: validity and trustworthiness. Our analysis provided two key findings.

First, our results indicate that the evaluation criteria used in the articles are to some extent linked to the philosophical assumptions of the research approach. Therefore, validity, as a positivistic criterion used to evaluate qualitative research, was mainly addressed in case studies, which is in line with the literature on case studies. Thus, Yin (2018) suggested logical tests, including validity and reliability, to judge the quality of a case study, and Eisenhardt (1989) underlined this by arguing that the aim is to build a testable and logically coherent theory. Nevertheless, techniques to ensure validity were also included in ethnographic studies. Trustworthiness was mainly found in grounded theory articles. Using trustworthiness and the specific criteria of credibility to evaluate grounded theory articles is in line with the literature. Thus, Corbin and Strauss (1990), Locke (2001) and Charmaz (2014) proposed credibility as a fundamental criterion to judge the quality of a grounded theory article. Nevertheless, researchers of ethnography and case study also referred to trustworthiness to ensure the rigor and quality of their articles.

Second, our analysis suggests that the techniques used to ensure validity and trustworthiness in qualitative research are closely related. Although Lincoln and Guba (1985) argued that positivist criteria (such as validity) are inappropriate to evaluate a qualitative study and therefore developed criteria based on a naturalistic point of view, our findings do not clearly reflect this difference between these two opposing perspectives. Rather, the techniques used to ensure validity and trustworthiness appear to be quite similar. For example, scholars mostly used triangulation, member checks, and peer debriefing in the same way to achieve either validity or trustworthiness.

Given that we only had access to published articles demonstrating the state of the art of using evaluation criteria, the underlying use of evaluation criteria during the research process remains a 'black box'. However, both key insights mentioned in this discussion are insufficient to answer our research question. Therefore, to uncover implicit evaluation criteria, we propose publishing an academic article as a socially constructed process. To shed light on this process, it would be necessary to gather information directly from authors who have published at least one qualitative study in a top-tier journal.

"Finally, my deductive editors often like propositions, and if so, I usually provide them" (Gehman et al., 2018, p. 296). This statement by Kathleen M. Eisenhardt, made at the 2016 Academy of Management Annual Meeting, highlights the influence of reviewers on the proposition output of inductive research. In terms of evaluation criteria, researchers may start with a research design that is consistent with the epistemological and ontological positions. Nevertheless, the research and review processes are influenced at different stages. Researchers submit their study to conferences and receive feedback, interact with colleagues during the research process, and finally report to reviewers to publish their article in peer-reviewed journals. The feedback researchers receive may encourage them to modify their initial positions. As publishing articles in leading journals is highly competitive (Aguinis et al., 2020), reviewers and editors may make additional demands that require further modifications. Therefore, it is essential to avoid possible misjudgements about an article's rigor and quality, which might be based on different philosophical understandings between authors and reviewers (Bonache, 2020).

In contrast to Pratt (2008), who used a survey design to study qualitative evaluation criteria, we suggest a qualitative interview study to provide a more detailed and thick description of this 'black box'. In doing so, we aim to explore the intentions and experiences of authors who have published at least one qualitative study in the articles analysed by us on how to deal with evaluation criteria in research practice as well as during the review process. A first attempt was made by Welch and Piekkari (2017), who conducted three expert interviews in their study of evaluative criteria in IB. To conceptualise our follow-up interview study, we suggest the framework shown in Figure 1.

On the one hand, the theoretically derived criteria to evaluate qualitative studies are described in textbooks and methodological articles. On the other hand, researchers describe explicit evaluation criteria in their articles, as we analysed in our study. These empirically derived criteria can be seen as "espoused theory" (Argyris and Schoen, 1974) which refers to the worldview and values that an individual claims to follow. According to Maxwell (1992), we argue that these criteria are mainly the outcome of institutional practices, such as the review process.

Therefore, we assume that there is a gap between the explicitly mentioned criteria in published articles and the implicit evaluation criteria used during the research process. According to Argyris and Schoen (1974), we call these implicitly used evaluation criteria “theory-in-use” in our framework; i.e., the worldview and values reflected in the behaviours that drive individual actions.

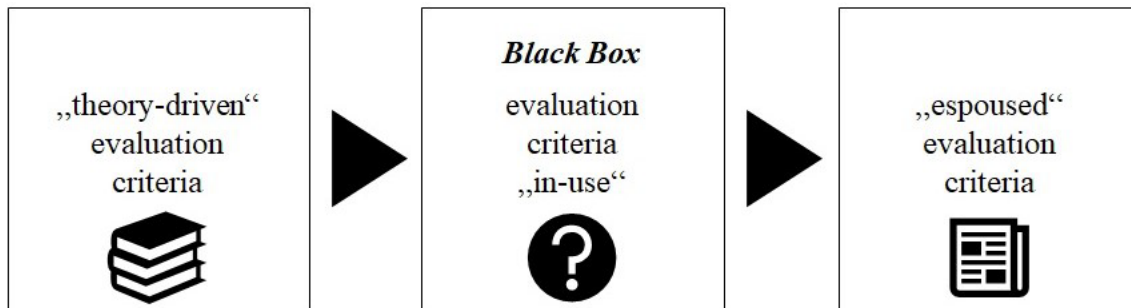


Figure 1: Framework to uncover qualitative evaluation criteria “in-use”

5. References

- Aguinis, H., Cummings, C., Ramani R.S. and Cummings, T.G. (2020) “An A Is An A: The New Bottom Line for Valuing Academic Research”, *Academy of Management Perspectives*, Vol 34, No. 1, pp 135-154.
- Altheide, D.L. and Johnson, J.M. (1994) “Criteria for assessing Interpretive validity in qualitative research”, in N.K. Denzin and Y.S. Lincoln (eds.) *Handbook of qualitative research* (pp 485-499), Sage, Thousand Oaks, CA.
- Argyris, C. and Schoen, D. (1974) *Theory in practice*, Jossey-Bass, San Francisco, CA.
- Bansal, P. and Corley, K.G. (2011) “The Coming of Age for Qualitative Research: Embracing the Diversity of Qualitative Methods”, *Academy of Management Journal*, Vol 54, No. 2, pp 233-237.
- Ben-Menahem, S.M., von Krogh, G., Erden, Z. and Schneider, A. (2016) “Coordinating Knowledge Creation in Multidisciplinary Teams: Evidence from Early-Stage Drug Discovery”, *Academy of Management Journal*, Vol 59, No. 4, pp 1308-1338.
- Bluhm, D.J., Harman, W., Lee, T.W. and Mitchell, T.R. (2011) “Qualitative Research in Management: A Decade of Progress”, *Journal of Management Studies*, Vol 48, No. 8, pp 1866-1891.
- Bonache, J. (2020) “The challenge of using a ‘non-positivist’ paradigm and getting through the peer-review process”, *Human Resource Management Journal*, Vol 31, No. 1, pp 37-48.
- Brutus, S., Aguinis, H. and Wassmer, U. (2013) “Self-Reported Limitations and Future Directions in Scholarly Reports: Analysis and Recommendations”, *Journal of Management*, Vol 39, No. 1, pp 48-75.
- Carton, A.M. (2018) “I’m Not Mopping the Floors, I’m Putting a Man on the Moon: How NASA Leaders Enhanced the Meaningfulness of Work by Changing the Meaning of Work”, *Administrative Science Quarterly*, Vol 63, No. 2, pp 323-369.
- Cassell, C. and Symon, G. (2006) “Taking qualitative methods in organization and management research seriously”, *Qualitative Research in Organizations and Management*, Vol 1, No. 1, pp 4-12.
- Caza, B.B., Moss, S. and Vough, H. (2018) “From Synchronizing to Harmonizing: The Process of Authenticating Multiple Work Identities”, *Administrative Science Quarterly*, Vol 63, No. 4, pp 703-745.
- Charmaz, K. (2006): *Constructing Grounded Theory: A Practical Guide through Qualitative Analysis*, Sage, London.
- Charmaz, K. (2014): *Grounded Theory in Management Research*, Sage: London.
- Corbin, J. and Strauss, A. (1990) “Grounded Theory Research: Procedures, Canons, and Evaluative Criteria”, *Qualitative Sociology*, Vol 13, No. 1, pp 3-21.
- Cornelissen, J.P. (2017) “Preserving Theoretical Divergence in Management Research: Why the Explanatory Potential of Qualitative Research Should Be Harnessed Rather than Suppressed”, *Journal of Management Studies*, Vol 54, No. 3, pp 261-401.
- Creswell J.W. and Creswell, J.D. (2018) *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*, Sage, Thousand Oaks, CA.
- Danneels, E. (2011) “Trying to become a different type of company: dynamic capability at Smith Corona”, *Strategic Management Journal*, Vol 32, No. 1, pp 1-31.
- De Rond, M. and Lok, J. (2016) “Some Things Can Never Be Unseen: The Role of Context in Psychological Injury at War”, *Academy of Management Journal*, Vol 59, No. 6, pp 1965-1993.
- Duberley, J., Johnson, P. and Cassell, C. (2012) “Philosophies underpinning qualitative research”, in G. Symon and C.M. Cassell (eds.) *Qualitative Organizational Research: Core Methods and Key Challenges* (pp 15-34), Sage, London.
- Easterby-Smith, M., Golden-Biddle, K. and Locke, K.D. (2008) “Working with Pluralism: Determining Quality in Qualitative Research”, *Organizational Research Methods*, Vol 11, No. 3, pp 419-429.
- Eisenhardt, K.M. (1989) “Building Theories from Case Study Research”, *Academy of Management Review*, Vol 14, No. 4, pp 532-550.

- Garg, S. and Eisenhardt, K.M. (2017) "Unpacking the CEO–Board Relationship: How Strategy Making Happens in Entrepreneurial Firms", *Academy of Management Journal*, Vol 60, No. 5, pp 1828-1858.
- Gehman, J., Glaser, V.L., Eisenhardt, K.M., Gioia, D., Langley, A. and Corley, K.G. (2018) "Finding Theory–Method Fit: A Comparison of Three Qualitative Approaches to Theory Building", *Journal of Management Inquiry*, Vol 27, No. 3, pp 284-300.
- Golden-Biddle, K. and Locke, K.D. (1993) "Appealing work: An investigation of how ethnographic texts convince", *Organization Science*, Vol 4, No. 4, pp 595-616.
- Harrison, S.H. and Rouse, E.D. (2014) "Let's Dance! Elastic Coordination in Creative Group Work: A Qualitative Study of Modern Dancers", *Academy of Management Journal*, Vol 57, No. 5, pp 1256-1283.
- Harvey, S. and Kou, C.Y. (2013) "Collective Engagement in Creative Tasks: The Role of Evaluation in the Creative Process in Groups", *Administrative Science Quarterly*, Vol 58, No. 3, pp 346-386.
- Helms, W.S. and Patterson, K.D.W. (2014) "Eliciting Acceptance For "Illicit" Organizations: The Positive Implications of Stigma for MMA Organizations", *Academy of Management Journal*, Vol 57, No. 5, pp 1453-1484.
- Hess, D. (2001) "Ethnography and the Development of Science and Technology Studies", in P. Atkinson, A. Coffey, S. Delamont, J. Lofland and L. Lofland (eds.) *Handbook of Ethnography* (pp 234-245), Sage, London.
- Huff, A. S. (1999) *Writing for Scholarly Publication*, Sage, Thousand Oaks, CA.
- Johnson, P. (2015) "Evaluating qualitative research: past, present and future", *Qualitative Research in Organizations and Management*, Vol 10, No. 4, pp 320-324.
- Johnson, P., Buehring, A., Cassell, C. and Symon, G. (2006) "Evaluating qualitative management research: towards a contingent criterionology", *International Journal of Management Reviews*, Vol 8, No. 3, pp 131-156.
- Kirk, J. and Miller, M. (1986) *Reliability and validity in qualitative research*, Sage, Newbury Park, CA.
- Klein, H.K. and Myers, M.D. (1999) "A Set of Principles for Conducting and Evaluating Interpretive Field Studies in Information Systems", *MIS Quarterly*, Vol 23, No. 1, pp 67-93.
- Kremser, W. and Blagoev, B. (2021) "The Dynamics of Prioritizing: How Actors Temporally Pattern Complex Role–Routine Ecologies", *Administrative Science Quarterly*, Vol 66, No. 2, pp 339-379.
- Lincoln, Y.S. and Guba, E.G. (1985) *Naturalistic inquiry*, Sage, Beverly Hills, CA.
- Locke, K.D. (2001) *Grounded Theory in Management Research*, Sage, London.
- Maxwell, J.A. (1992) "Understanding and validity in qualitative research", *Harvard Educational Review*, Vol 62, No. 3, pp 279-301.
- Miles, M.B., Huberman, A. M. and Saldaña, J. (2020) *Qualitative Data Analysis: A Methods Sourcebook*, Sage, Thousand Oaks, CA.
- Monin, P., Noorderhaven, N., Vaara, E. and Kroon, D. (2013) "Giving Sense to and Making Sense of Justice in Postmerger Integration", *Academy of Management Journal*, Vol 56, No. 1, pp 256-284.
- Ozcan, P. and Gurses, K. (2018) "Playing Cat and Mouse: Contests over Regulatory Categorization of Dietary Supplements in the United States", *Academy of Management Journal*, Vol 61, No. 5, pp 1789-1820.
- Podsakoff, P., MacKenzie, S., Podsakoff, N. and Bachrach, D. (2008) "Scholarly influence in the field of management: A bibliometric analysis of the determinants of university and author impact in the management literature in the past quarter century", *Journal of Management*, Vol 34, No. 4, pp 641-720.
- Prasad, A. and Prasad, P. (2002) "The Coming of Age of Interpretive Organizational Research", *Organizational Research Methods*, Vol 5, No. 1, pp 4-11.
- Pratt, M.G. (2008) "Fitting Oval Pegs into Round Holes: Tensions in Evaluating and Publishing Qualitative Research in Top-Tier North American Journals", *Organizational Research Methods*, Vol 11, No. 3, pp 481-509.
- Ravasi, D., Rindova, V. and Stigliani, I. (2019) "The Stuff of Legend: History, Memory, and the Temporality of Organizational Identity Construction", *Academy of Management Journal*, Vol 62, No. 5, pp 1523-1555.
- Scandura, T. and Williams, E. (2000) "Research methodology in management: Current practices, trends, and implications for future research", *Academy of Management Journal*, Vol 43, No. 6, pp 1248-1264.
- Schinoff, B.S., Ashforth, B.E. and Corley, K.G. (2020) "Virtually (In)separable: The Centrality of Relational Cadence in the Formation of Virtual Multiplex Relationships", *Academy of Management Journal*, Vol 63, No. 5, pp 1395-1424.
- Thelwall, M. and Nevill, T. (2021) "Is research with qualitative data more prevalent and impactful? Interviews, case studies, focus groups and ethnographies", *Library and Information Science Research*, Vol 43, No. 2, 101094.
- Tracy, J.S. (2010) "Qualitative Quality: Eight "Big-Tent" Criteria for Excellent Qualitative Research", *Qualitative Inquiry*, Vol 16, No. 10, pp 783-908.
- Welch, C. and Piekkari, R. (2017) "How should we (not) judge the "quality" of qualitative research? A re–assessment of current evaluative criteria in international business", *Journal of World Business*, Vol 52, No. 5, pp 714-725.
- Whittemore R., Chase S.K. and Mandle C.L. (2001) "Validity in Qualitative Research", *Qualitative Health Research*, Vol 11, No. 4, pp 522-537.
- Wright, A.L., Zammuto, R.F. and Liesch, P.W. (2017) "Maintaining the Values of a Profession: Institutional Work and Moral Emotions in the Emergency Department", *Academy of Management Journal*, Vol 60, No. 1, pp 200-237.
- Yilmaz, K. (2013) "Comparison of Quantitative and Qualitative Research Traditions: epistemological, theoretical, and methodological difference", *European Journal of Education*, Vol 48, No. 2, pp. 311-325.
- Yin, R.K. (1994) *Case Study Research: Design and Methods*, Sage, Thousand Oaks, CA.
- Yin, R.K. (2018) *Case Study Research and Applications: Design and Methods*, Sage, Thousand Oaks, CA.

Research on an Assessment Method: Student Feedback on Video-Feedback on Mandatory Assignments

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Abstract: At the Inland Norway University of Applied Sciences, Norway, we have a study programme called Knowledge Management. Here we have tested out video-feedback on mandatory assignments. In order to assess how students perceive this type of feedback. Previous studies show that students value feedback and supervision almost higher than lectures and other learning activities. Feedback and supervision will guide improvement and is thought to support the experienced learning outcome. However, our experiences are that students are mostly concerned whether or not the assignments are approved. Hence, providing targeted feedback may or may not be reflected upon. In order to obtain the students' attention to the feedback provided, we have tested out video-feedback. The idea is that a video file may make it more personal and thus be perceived as more targeted to their assignment. Through our research we would like to unveil several issues; if it contributes to the students' learning outcome, if they find it useful, and if they understand how to improve their assignments. In this paper, we will argue for an abductive method towards researching this topic as we will iterate between theory that will enlighten us as we are conducting the study. We chose to view this as a case study and as we are interested in the students' perceptions, we argue for a qualitative study where we conduct semi-structured interviews, both individually and in groups. We will present the research method in detail as well as our discussion of the appropriateness of this qualitative method.

Keywords: Mixed-Method, Formative Assessment, Video-Feedback, Learning

1. Introduction

Research is about collecting, analysing and interpreting data in order to understand a case or a phenomenon (Williams, 2007). In this case study, we are looking to investigate how students perceive video-feedback on their assignments. Does it give them insights on how to improve and how to better meet the learning objectives defined for the courses in question?

Our respondents are all students at the Knowledge Management study programme at the Inland Norway University of Applied Sciences, Kongsvinger, Norway. The study programme consists of four courses: Two in the autumn semester and two in the spring semester. The students are mainly adult learners in a work life.

Previous investigations have shown that what students highlight from their education, is mainly about their feedback (Mathisen, 2012) and it is the formative feedback that is referred to. However, formative assessment is not a unanimous way of providing feedback. According to Bennet (2011), formative assessment consists of several interrelated issues and indeed it has yet no standard practices. Bloom (1969, p. 48) states the purpose of formative evaluation is "to provide feedback and correction at each stage in the teaching-learning process". Hence, formative assessment is also called "assessment for learning" (Bennett, 2011).

There is a discrepancy between the time allocated to providing feedback and the time it takes to develop the feedback (Mathisen, 2012). At the same time, feedback is salient for the students' development and understanding of improvement and their strengths and weaknesses. Feedback is helping the students to establish an effective learning situation by providing an understanding of the requirements and a direction for further work. It also aids in establishing a relationship with the students and lecturers, something that has proved helpful for promoting learning (Mathisen, 2012).

According to Hattie and Timperley (2007) the quality of the feedback is determined by answering three questions:

1. Where am I going?
2. How am I going?
3. Where to next?

These are necessary to answer as this will provide the students with an idea of their performance if they are meeting the requirements and will also push them forward. However, it is thus important that the students

understand the value of pushing forward and that this means something to them (Hattie and Timperley, 2007). Hence, Gamlem (2022) claims that students need to develop first and then experience autonomy, self-control and self-discipline.

Regarding what to present, Mathisen (2012) suggests screen capture, and recording videos. He also recommends pointing out in the text where the students can improve. This requires technology which will support this type of video-feedback and skilful lecturer to pinpoint the different areas.

To understand how to reach a level of reflection with the students, which enables the understanding of how to enhance quality, understanding and further development, is important (Gamlem, 2022). However, this requires that we can communicate what quality is and are able to promote understanding as well as pointing this forward.

Borup et al. (2014) refer to supporting immediacy which is defined by Wiener and Mehrabian (1968) as “the level of psychological distance that exists within communication”. Hence, a perceived social presence can be a premise regarding a cognitive presence, meaning to the extent that students is enabled to construct knowledge through interacting with peers. Moreover, Borup et al. (2014) claim that students find audio feedback more personal and the connection with the lecturers is strengthened. They feel that the lecturer knows them personally and that he/she care about how they (as students) are doing. This is supported by Ice et al. (2007) when they presented an analysis of data showing that audio feedback made students feel that the lecturer cared about their learning process, something that made them feel involved. Borup et al. (2014) sum up the findings regarding audio feedback as making it easier to obtain a sense of closeness, that the video displayed more emotions and was perceived as “more conversational and interactive” in addition to making it easier to feel connected.

1.1 Our case study

In our study our respondents receive written feedback in one of the courses and video-feedback in the other course in both the autumn semester and in the spring semester. In the autumn semester, the students received a 5–8-minute video with feedback on their mandatory assignment, and in the spring semester they received a 3–4-minute video-feedback.

In the first video-feedback (in the autumn), the feedback focused mostly on the assignment and their performance on the assignment, what they had done well and what they had to improve on. The second video feedback (in the spring) the focus was on how they performed according to the learning objectives and how to better meet the learning objectives.

The difference in the video-feedback was due to diving into research on formative assessment, and in particular, video-feedback. The changes made from the first to the second was based both on the feedback from the students in the autumn semester, and what the research articles concluded on. The table below (table 1) provides an overview of the semesters and the types of feedback.

The purpose of both video-feedbacks was to support their learning outcomes and to enhance the work relevance of their education. The purpose of the methodological investigations is to establish that we are investigating our efforts in a way that we can determine that the outcome of the primary project is measuring the right things.

Table 1 Development of formative assessment from 1st to 2nd semester

	1 st semester	Upgrade	2 nd semester
Video feedback	Focus: feedback regarding the assignment, what was expected. Secondary: learning objective.	Faculty staff reading up and discussing. Reflective practice.	Focus: learning objectives, pros and cons regarding assignment, and (generic) pointing towards learning objectives not yet touched in the assignment.
Written feedback	Focus: some feedback on assignment, and some generic feedback with suggestions for improvement.	None	Focus: some feedback on assignment, and some generic feedback with suggestions for improvement.

We may unveil the students’ perceptions of video-feedback through questionnaires, feedback from students via email, and follow-up interviews. But how can we be certain that our efforts really pay off in form of enhanced learning outcome and that the students are able to utilize their learning back in their organizations?

In the following, we will discuss the research methodology and how our methodological choices have supported our investigations.

2. Methodological considerations

We did the research in two rounds: the first after the autumn semester and the second after the spring semester. We chose for both rounds to do a mixed method research (Creswell, 2009) using both a survey and follow-up interviews.

We also chose to look at this undertaking as a case study (Yin, 2014). However, instead of submerging into several case studies in order to generalize, we are digging into one case study over time in order to get a richer understanding of the case in question (Dubois and Gadde, 2014). According to Buchanan and Bryman (2007), case study research reflects the diversity of social sciences and this is the way of fulfilling these needs.

As we are not only looking to confirm previous research but rather investigate if any confirmations support a development of the outcome. Hence, we firstly need to know if our takes on video-feedback confirm previous studies, and secondly, if this support work relevance as outcome of the courses. We have thus chosen an abductive method mainly interpreting the quantitative data in a qualitative way, supplementing with qualitative interviews.

Also, we explored research on the topic (video-feedback) and combined with the results after the first semester, we tested a slightly different version of video-feedback. This abductive approach allows us to look for a deeper meaning, different patterns and frameworks and more importantly, different theories. The iterative way of conducting this research have allowed us to look further than how well our data cohered with previous research.

3. Results and discussion

The first round of research confirmed the theories of creating a closeness and a sense of care from lecturer. The students appreciated the personal feeling and claimed to have learned how to improve from the video-feedback. This all aligns with the theory of Mathisen (2012), Borup et al.(2014), Hattie and Timperley (2007), Ice et al. (2007) and Gamlem (2022).

As we had different ideas for the second round of video-feedback, the questions regarding their perceptions were directed towards not only towards the feeling of closeness, understanding of possible improvement, but also regarding how they understood the learning objectives of the course, and if and how this has had an impact on their understanding of the curriculum (Hattie and Timperley, 2007; Gamlem, 2022). This understanding may thus improve their ability of making use of the learning back in their organizations, hence support work relevance (Vold and Haave, 2020).

The students claim to better understand the learning objectives as they feel reminded of these objectives. The combination of feedback on how their assignments align with the learning objectives have provided them with an understanding of what they need to do to improve, and better meet these learning objectives. The survey, however, showed an equally distributed response between what they agree on and do not agree on the feedback being personal. This is interesting feedback and there may be several possible reasonings for this and we need to dig deeper into this through further interviews; why do they not perceive the last version of video-feedback as personal? Is it too focused on the learning objectives and what how they need to perform in order to meet the overall learning goals of the course?

We asked the students to point out the feedback message that they valued highest and how this contributed to their learning outcome. Some of the responses are about the “technical” part of writing an assignment, but some are also about getting feedback on their understanding. These latter responses, we interpret to enhance the learning outcome (Hattie and Timperley, 2007; Mathisen, 2012; Gamlem, 2022). The follow up interviews confirm this interpretation and here the students can bring examples of understanding situations at their workplace and reference the curriculum.

4. Conclusion

The abductive way of doing an in-depth case study (Dubois and Gadde, 2002, 2014) have provided us with extended experience regarding how to conduct video conferencing, what to focus on and to some extent how

to make it work-life relevant. Targeting the learning objectives and seeking to point out where they meet the learning objectives and where they need to improve, in order to support the learning outcome, had a greater focus in the second round of video-feedback. The findings were now not unanimously towards it being perceived as “personal” but supported the learning outcome. Many of the respondents are able to point out specific “items” in the feedback that has had an impact on their further work towards meeting the learning objectives.

4.1 Further research

We still need to further establish why the students are divided in their reply regarding that they do not feel that the video-feedback was personal, and how this has impacted on their perceptions of relevance. Also, we still need to establish the connection between the video-feedback and possible connection to work relevance. We may assume that video-feedback is now provided *in a way that they are able to relate the learning to their own experiences*. We may thus utilize longitudinal studies that follow the students in their work-life.

References

- Bennett, R. E. (2011) ‘Formative assessment: A critical review’, *Assessment in education: principles, policy & practice*, 18(1), pp. 5–25.
- Bloom, B. S. (1969) ‘Some Theoretical Issues Relating to Educational Evaluation’, *Teachers College record (1970)*, 70(10), pp. 26–50. doi: 10.1177/016146816907001003.
- Borup, J. et al. (2014) ‘Examining the impact of video feedback on instructor social presence in blended courses’, *International Review of Research in Open and Distributed Learning*, 15(3), pp. 232–256.
- Buchanan, D. A. and Bryman, A. (2007) ‘Contextualizing methods choice in organizational research’, *Organizational research methods*, 10(3), pp. 483–501.
- Creswell, J. W. (2009) *Research design: qualitative, quantitative, and mixed methods approaches*. 3. ed. Los Angeles, Calif. [u.a.]: Los Angeles, Calif. [u.a.]: Sage.
- Dubois, A. and Gadde, L.-E. (2002) ‘Systematic combining: an abductive approach to case research’, *Journal of business research*, 55(7), pp. 553–560.
- Dubois, A. and Gadde, L.-E. (2014) ‘“Systematic combining”—A decade later’, *Journal of Business Research*, 67(6), pp. 1277–1284.
- Gamlem, S. T. M. (2022) *Feedback and assessment for learning and development (In Norwegian:Tilbakemelding for læring og utvikling)*. 2. utgave. Edited by S. T. M. Gamlem. Oslo: Gyldendal.
- Hattie, J. and Timperley, H. (2007) ‘The Power of Feedback’, *Review of Educational Research*, 77(1), pp. 81–112. doi: 10.3102/003465430298487.
- Ice, P. et al. (2007) ‘Using asynchronous audio feedback to enhance teaching presence and students’ sense of community.’, *Journal of Asynchronous Learning Networks*, 11(2), pp. 3–25.
- Mathisen, P. (2012) ‘Video Feedback in Higher Education – A Contribution to Improving the Quality of Written Feedback’, *Nordic journal of digital literacy*, 7(2), pp. 97–113. doi: 10.18261/ISSN1891-943X-2012-02-02.
- Vold, A. T. and Haave, H. M. (2020) ‘Relevance of Adult Higher Education on Knowledge Management in the Healthcare Sector’, in. Academic Conferences and Publishing International Limited.
- Wiener, M. and Mehrabian, A. (1968) *Language within language: Immediacy, a channel in verbal communication*. Ardent Media.
- Williams, C. (2007) ‘Research methods’, *Journal of Business & Economics Research (JBER)*, 5(3).
- Yin, R. K. (2014) *Case study research: design and methods*. 5. edition. Los Angeles: Los Angeles: SAGE.

PhD Research Papers

Democratic centralism: The root cause of poor municipal performance in South Africa

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Abstract: This paper is a product of a Doctoral study that applied grounded theory to derive a performance improvement model for a particular Municipality in South Africa. Drawing from this study, this paper argues that democratic centralism, which manifests in politicised bureaucracy and implemented through the ANC policy of cadre deployment, is the root cause of poor performance across South African municipalities. In advancing this argument, the paper interrogates public management literature to conceptualise poor municipal performance and justify the relevance of the politics-administration dichotomy as a framework for positioning democratic centralism as the root cause of poor performance in South African municipalities. In addition, interrogating public management literature allowed the author to identify methodological limitations of past studies and select grounded theory as the most appropriate research design to address these limitations. In applying grounded theory, the author used purposive sampling to identify research participants who were subsequently interviewed using a semi-structured interview guide. In preparation for data analysis, the author recorded and transcribed the information obtained from the interviews. Thereafter, the author used open coding with particular emphasis on constant comparative analysis and theoretical sampling. The use of these techniques allowed the author to move the level of abstraction from open codes through to empirical categories leading to generation of empirical explanations that link democratic centralism to poor performance in South African municipalities. To this end, the paper empirically linked poor municipal performance, often displayed through violent protests, to democratic centralism, a phenomenon entrenched into the South African public service through the ANC policy of cadre deployment.

Key words: Democratic Centralism, Poor performance, South African Municipalities, Cadre deployment

1. Introduction

Following years of oppression and conflict, South Africa attained democracy when the African National Congress (ANC), a political party that had been the face of the struggle for liberation, assumed power in 1994. When the ANC came to power, its priority was to dismantle the apartheid architecture and create a democratic and inclusive government (Gumede, 2015) for improved delivery of basic services to all. To achieve this objective, the ANC introduced a range of public management reforms known as New Public Management (NPM) anchored on liberal ideology. Although the ANC has managed to build a democratic administrative structure, through a comprehensive policy and legislative framework, it has failed to fulfil its promise of improved service delivery. The escalating wave of service delivery protests common in poor black communities (Alexander, 2010), is indicative of the failure of the ANC in addressing the apartheid legacy of racial discrimination in service delivery. This failure has triggered a debate within South African public management scholars with most attributing poor municipal performance to corruption, nepotism, lack of skills, and political interference (Kariuki & Reddy, 2017; Kgatle, 2017; Makole, 2022; Mamokhere, 2021; Mngomezulu, 2020; Nzimakwe & Ntshakala, 2016).

Without negating the contribution of past studies, this paper argues that democratic centralism is the root cause of poor performance across all South African municipalities. Therefore, the factors outlined above are consequences of democratic centralisms expressed through violent protests, which communities use as a means of expressing frustration over poor service delivery. The paper further argues that inadequate recognition of democratic centralism as the underlying cause of poor municipal performance has resulted in ineffective empirical solutions to performance challenges that engulf South African municipalities. To address this problem, the paper applies grounded theory with particular emphasis on constant comparative analysis and theoretical sampling. The use of these techniques comes against realisation that previous grounded theory studies on performance management in South African public institutions (Ndevu, 2019; Pretorius & Schurink, 2007) have not adequately used them to generate empirical explanations on factors that impede performance in South African municipalities. In undertaking a journey towards generating empirical explanations in this regard, the paper interrogates key dimensions of poor performance in South African municipalities. Thereafter, it outlines the research strategy, procedures, and methods used for collecting and analysing empirical data before presenting and discussing the empirical results.

2. The analysis of poor performance in South African municipalities

Poor performance in South African municipalities is intertwined with the history of racial segregation introduced by the Dutch after occupation of the Cape in 1652. According to Govender and Ramodula (2020), municipalities established during this period were designed to protect the interests of the white settlers at the exclusion of indigenous people. This exclusion manifested in different forms that included depriving the indigenous people of their political rights (Tsatsire, Raga, Taylor, & Nealer, 2009) and deliberately providing them with poor services (Govender & Ramodula, 2020). This situation intensified with the expansion of municipalities during the British rule from 1795 with Ordinance 9 of 1836 used as a framework for institutionalising racial discrimination in which municipal positions were reserved for English males (Marais, 1989). Racial inequalities continued through 1910 with the creation of the Union of South Africa and gained momentum in 1948 when the National Party came to power.

In pursuit of its policy of racial segregation, the National Party promulgated the Group Areas Act (Act 41 of 1950) as an instrument for institutionalising poor service delivery in black communities. Through this Act, communities were transplanted to other areas, which due to their total lack of development or facilities have rapidly assumed the slum characteristics (Mabin, 1992). Failure to provide descent services coupled with the growing discontent over political exclusion and social injustice of the apartheid regime resulted in a wave of violent protests across the country in the 1970s and 1980s. These protests ushered in a new era of transition from discriminatory local government system to a democratic and inclusive system that came after the 1994 elections. The Municipal Systems Act 32 of 2000 is the founding pillar of democratic local government system anchored in liberal ideological posture associated with New Public Management. Specifically, the Act provides the basis for Integrated Development Planning (IDP), which according to Mathebula (2018) and Mamokhere (2021) is a tool for implementation of New Public Management in South African municipalities. While New Public Management dominated management literature in the 1980s as panacea for poor performance in public institutions, its adoption in South African municipalities has not been successful. The increasing wave of violent service delivery protests that have become a common phenomenon across South African communities bears testimony to the failure of New Public Management in improving service delivery in South African municipalities. These protests often include blockading of major highways, erection of barricades, burning of public buildings and politicians' houses (Mamokhere, 2021). The fact that these protests originate from poor black communities (Alexander, 2010) shows that the ANC led municipalities have failed to improve service delivery in communities that were deliberately excluded from decent service delivery during the apartheid era.

The failure of the ANC led municipalities in turning the tide of poor service delivery in black communities has generated a heated debate on the issue of poor municipal performance in South Africa. This debate has divided South African scholars into two camps. On one hand is a group of scholars such as Cloete (2009) as well as Kariuki and Reddy (2017) who attribute poor performance in South African municipalities to inadequate use of evidence for decision-making owing to a fragmented approach to performance management. On the other hand, another group of scholars identifies political interference as the main reason for poor performance (Ndevu, 2022; Maqoko, 2015; Masiya, Davids & Manga, 2021). In corroborating this view, Kgatle (2017) attributes poor performance in Tshwane Metropolitan Municipality to interference of the ANC in the administration of the Municipality. Similarly, studies conducted in other municipalities in different provinces (Bless, 2023; Maqoko, 2015; Mngomezulu, 2020) reported a similar trend. What is common in most studies that highlight political interference as the main service delivery constraint is the notion of cadre deployment. As Shava and Chamisa (2018) point out, the ANC's policy of cadre deployment has eroded accountability mechanism. Elaborating on this, Gumede (2015) argues that political appointees are loyal to political structures that appointed them thereby creating an impression that the ANC is bigger than the government. This mentality has weakened human resources management practices and created a corrupt system of political patronage (Shava & Chamisa, 2018). Consequently, political patronage gives rise to incompetence due to the appointment of unqualified people to strategic positions within municipalities (Makole, 2022; Mlambo, Zubane, & Thusi, 2022; Shava & Chamisa, 2018).

While most scholars give an impression that political interference is a recent phenomenon that came with the ANC government (Kgatle, 2017; Mngomezulu, 2020; Shava & Chamisa, 2018), this paper traces political interference to the apartheid era. To support this thinking, the paper draws from Gumede (2015) who posits that the apartheid government under the National Party was characterised by top-down management based on centralised power in pursuit of racial segregation. This means that political interference was the hallmark of the apartheid regime. Looking at the original values of the ANC pillared on accountability and transparency (De Jager & Steenekamp, 2015), there was an expectation that this culture would end in the new democratic dispensation.

However, the ANC government displays similar tendencies of centralism characterised by inward looking, self-seeking, and self-preserving that defined the apartheid administration (De Jager & Steenekamp, 2015).

Suttner (2003) describes democratic centralism as the principle where a few leaders make decisions and send out commands to members who obey them unquestionably. As Gumede (2015) points out, this is how the ANC governs itself and it extends its tendencies into government by employing its loyal cadres to strategic positions. Evidence supporting this view indicates that the ANC micro-manages the government and decides on who should get government contracts (Ndevu & Muller, 2018). In addition, the ANC has intensified efforts to control state institutions including the Judiciary (De Jager & Steenekamp, 2015). While the Judiciary has largely been resilient, most institutions of democracy have succumbed to political interference leading to the demolition of politics-administration boundaries. The deliberate breach of the politics-administration divide has created a culture of poor performance characterised by corruption, lack of accountability, and nepotism. Therefore, this paper argues that improving performance in South African municipalities requires a shift from democratic centralism to liberal democracy that embraces collective and transparent decision-making.

3. Theoretical framework

The principle of democratic centralism, which defines the structure and operational behaviour of political parties aligned to Marxism, provides a theoretical foundation for this paper. Ideas about democracy and centralism emerged from Marx (Angle, 2005) but Lenin combined the two to formulate a theory that explains organisational behaviour of revolutionary political parties. Specifically, Lenin argued for a revolutionary communist party organised according to military principle of democratic centralism (Morgan, 2015) in which an authoritative leadership takes decisions on behalf of ordinary members (Suttner, 2003). Under this system, loyalty to the party and leadership is sacred (Gumede, 2015). In view of these characteristics, Morgan (2015) maintains that democratic centralism promotes dictatorship and abuse of power. Despite this limitation, Marxism-Leninism ideology continues to influence the political behaviour of the ruling elite in Africa (De Jager & Steenekamp, 2015). Therefore, it is not surprising that the ANC displays a political behaviour associated with democratic centralism. As Gumede (2015) points out, this behaviour starts from within the ANC where decision-making is vested in a few elites with ordinary members expected to implement decisions religiously. Through its policy of cadre deployment, which is a practice of employing loyal party officials to strategic positions within the government, the ANC has extended its tendencies of democratic centralism to all aspects of the South African public service (De Jager & Steenekamp, 2015). As implied in several studies (Madumo, 2015; Makole, 2022; Mafunisa, 2003; Ndevu, 2019), the collapse of the politics-administration boundaries has given rise to poor services across South African municipalities. Therefore, this paper is explicit in its understanding of manifestations of poor performance in South African municipalities from the perspective of the politics-administration dichotomy.

In order to provide the context to the politics-administration dichotomy as the underlying theoretical framework for this paper, the author draws from Woodrow Wilson's study on Administration. Published in 1887, this study marks the first stage in the evolution of Public Administration (Bartholomew, 1972) but evidence suggests that separation of politics and administration was already a topic of discussion long before this publication. Outlining the history of this notion, several scholars (Gruening, 2001; Lee, 1995; Waldo, 1948; Rosenbloom, 2008) maintain that discontent over the spoils system planted a seed for transformational ideas expressed in the American Civil Service Act of 1883, which paved the way for a career public service separate from politics. Based on the strength of this evidence, it is clear that Wilson gave impetus to ideas that had already been advanced by the reformers of the U.S civil service in the 19th century (Van Riper, 1987). Therefore, what made Wilson's publication famous is that it appeared at the time when the American people began to express dissatisfaction with government policies and rampant corruption (Lamidi, 2015). Despite the controversy about its origin, the politics-administration dichotomy remains popular amongst South African scholars.

Mafunisa (2003) used the politics-administration dichotomy to answer the question of whether senior public servants should be political or non-political when performing their duties. This study established that South Africa follows a model of politicised bureaucracy where elected office-bearers have a mandate to control the public service. In view of this, Mafunisa (2003) concludes that there is no distinction between politics and administration and between party and state leading to abuse of political power. In another study, Madumo (2015) used the politics-administration dichotomy as a framework to understand service delivery impediments in South African municipalities. This study attributes poor service delivery to unrestricted interference of ANC leaders in administrative and managerial affairs of municipalities. This attribution is consistent with the findings of recent studies that have applied the politics-administration dichotomy as an interpretive framework. For

example, Mngomezulu (2020) established that inappropriate political interference in administrative matters is at the centre of poor municipal performance in South Africa. In addition, Makole (2022) revealed that cadre deployment undermines the capacity of state to improve the quality of service delivery. Based on the foregoing, it is clear that the ANC uses cadre deployment as an instrument for extending democratic centralism to all aspects of public service to the detriment of service delivery. Therefore, it is important to understand service delivery challenges in South African municipalities within the theoretical boundaries of politics-administration dichotomy.

4. Research methodology

The author of this paper believes in subjective epistemology and subscribes to an ontological posture that recognises the existence of multiple realities. This declaration comes against Chun Tie, Birks and Francis' (2019) advice that researchers should reflect their philosophical beliefs and interpretations of the world prior to commencing research. Most importantly, this declaration is consistent with Guba and Lincoln's (1994) view that those who embrace the existence of multiple realities and subjective interpretation of phenomena belong to the constructivist research tradition. For this reason, this paper adopts a qualitative research strategy anchored on constructivist grounded theory design to explore the root cause of poor performance in South African municipalities. There are two main reasons that influenced the author's decision to use constructivist grounded theory. First, it allowed the author to use literature review to conceptualise the study and frame the research questions (Strauss, 1987). Second, this approach acknowledges a strong interrelationship between the researcher and the participants (Charmaz, 2014) thereby allowing the author to use personal experience and knowledge to enrich the discussion in this paper.

The next step after defining the research strategy and design is to describe the research target group, which in this case consists of all employees of the Municipality that formed the research setting for the study that informed this paper. However, due to limited time and resources, it was not possible to include every member of the general population in the study. Therefore, the author selected a subset of the general population believed to be knowledgeable about the subject matter of relevance to this paper. This group included senior municipal officials ranging from Group Heads, Heads of Divisions, Directors and Deputy Directors. In order to get a balanced perspective, the author included Specialists responsible for different areas within the Municipality as well as general workers and representatives of labour. These participants were drawn from a staff list obtained from the Municipality. Although there is no consensus on the appropriate sample size for grounded theory studies, most researchers suggest a sample of 10 to 30 participants (Bernard, 2006; Boddy, 2005; Guetterman, 2015; Morse, 1994). Therefore, this paper used a sample size of 30 but at the end only 24 participated in the study as others did not show interest.

Based on the desire to obtain in-depth information as required in qualitative research, the author used a semi-structured interview guide. This instrument allowed the researcher to obtain deep insights (Sekaran & Bougie, 2009) on key dimensions of municipal performance. Subsequently, the author recorded and transcribed information obtained from research participants in order to facilitate data analysis. In line with key tenets of grounded theory, the author adopted an iterative process of data collection and analysis that began with open coding to identify incidents and events in the data. A comparison of incidents and events in the first batch of transcripts informed further data collection and triggered an iterative process of comparing properties of newly collected data to the initial data. At this point, similar data properties were grouped together to create concepts that were further compared against each other to inform further data collection and iterative comparison of initial codes and newly created concepts. This iterative process of data collection and analysis culminated in what Strauss and Corbin (1998) refers to as selective coding. At this point, all data properties converged on political interference as the underlying cause of poor municipal performance. After collecting further information through theoretical sampling, cadre deployment emerged as a critical enabler of political interference. After embarking on further literature review and reflecting on the relationship between the empirical data and the theoretical framework underpinning this study, the author discovered that democratic centralism provides a theoretical foundation for use of cadre deployment as an instrument for political interference in South African municipalities.

5. Study results

The research results presented in this paper represent the views of the research participants regarding factors that hinder performance in South African municipalities. In the main, the participants highlighted cadre deployment as the main reason behind poor performance across South African municipalities. In this regard, the participants' views confirmed the findings of previous studies (Shava & Chamisa, 2018; Makole, 2022; Mngomezulu, 2020) that attribute poor service delivery in South African municipalities to the ANC culture of appointing its loyal members to strategic positions within municipalities. Upon further probing, the participants pointed to a number of ways through which cadre deployment impedes service delivery. First, the participants noted that deploying politicians to strategic positions within municipalities creates opportunities for corruption. As one participant pointed out, "politicians put pressure on management to award contracts to particular individuals". This statement reiterates the findings expressed in Nzimakwe and Ntshakala (2016) who state that it is common for politicians to interfere in procurement decisions in South African municipalities.

Elaborating on the issue of corruption, another participant said, "irregular awarding of contracts for procurement of goods and services leads to delays in service delivery because such contracts are often challenged at huge cost to the City". On this point, the results are similar to evidence showing that corruption is the main source of wasteful expenditure in South African municipalities (Moeti, 2014). In expressing this view, the participants acknowledged that there is a direct link between political interference and corruption in South African municipalities. Thus, the participants' view underscore the findings of previous studies that highlight political interference in procurement processes as the main reason for rampant corruption in South African municipalities (De Visser & Akintan, 2008; Moeti, 2014).

Second, the participants connected the issue of corruption to lack of accountability. Generally, the participants mentioned that political appointees deliberately disregard established accountability protocols within municipalities because they have political protection. In this regard, the results reiterate Shava and Chamisa's (2018) finding that cadre deployment has eroded accountability and created a fertile ground for corruption and impunity. The results further confirm Gumede's (2015) argument that politically deployed cadres are more loyal to the political party that appointed them than government entities in which they are deployed. In addition, the results further corroborate the finding that cadres regard themselves accountable to the ANC committees that deploy them and not the public (Twala, 2014).

The third issue closely related to lack of accountability and corruption is the abuse of state resources for political expediency. In this regard, the participants mentioned that political parties appoint their loyal members to municipalities in order to ensure that politically connected businesses get tenders and subsequently finance political activities of the ANC. On this issue, the results are consistent with Madumo's (2016) findings that ANC uses cadre deployment as a mechanism for controlling state resources for political gain. Further, the results reiterate Gumede's (2015) view that the ANC is increasingly governing in the interest of its own constituencies.

Fourth, the participants highlighted nepotism as a consequence of cadre deployment. Upon probing on how this affects performance, the respondents mentioned that nepotism has created a culture where politicians appoint their friends and relatives to positions for which they do not qualify thereby constraining effective delivery of services. In this regard, the results are similar to Shava and Chamisa's (2018) finding that cadre deployment has weakened human resource practices in municipalities and reduced staff morale because appointments and promotions are based on political considerations not merit. Closely related to unfair recruitment and promotion practices is the issue of incompetence, which as the research participants pointed out, is a direct consequence of cadre deployment. The participants' views in this regard corroborate the argument expressed in Twala (2014) as well as in Shava and Chamisa (2018) that cadre deployment leads to appointment of incompetent individuals who are unable to perform their functions effectively. These results reflect a departure from the original values of the ANC, which according to Twala (2014) had resolved in its KwaBe conference in 1985, that implementation of cadre deployment should at all times guard against favouritism.

The last aspect of cadre deployment that has a direct bearing on the performance in South African municipalities is lack of trust between politicians and career public officials. In articulating this issue, the participants mentioned that political appointees come with a political mandate, the implementation of which is often in conflict with professional ethics and standards governing public administration. As one participant pointed out, "politicians always insist on implementing a political agenda even if it is an illegitimate agenda". The results further show that conflicts arise when public officials are directed to implement such a mandate and this fuels mistrust between politicians and public officials and creates a toxic work environment characterised by discontent and poor performance". These results corroborate Ndevu's (2019) findings that cadre deployment

has eroded trust between politicians and public officials. The results are also similar to Maqoko's (2015) study, which found that competent public officials are often purged from service due to mistrust between politicians and senior municipal officials.

6. Discussion

In the main, the findings of this study corroborate Gumede's (2015) and Twala's (2014) argument that cadre deployment, which is the practice of appointing political loyalists to strategic positions within municipalities, is a strategy used by the ANC to entrench democratic centralism within the South African public service. Derived from Lenin's idea that revolutionary communist party are organised according to military principles, democratic centralism promotes dictatorship and abuse of state power thereby giving rise to corruption and lack of accountability. In particular, the participants mentioned that through its policy of cadre deployment, the ANC directly influences appointments to strategic positions within municipalities and controls distribution of resources through corrupt interference in procurement decisions. De Jager and Steenekamp (2015) describe these tendencies as signs of democratic centralism similar to the apartheid bureaucracy. Elaborating on this, Gumede (2015) argues that democratic centralism tendencies originate from the belief amongst the ANC members that their liberation credentials give them entitlement to government spoils. In view of this, the paper argues that the ANC's attitude has destroyed the politics-administration boundaries to the detriment of service delivery.

As noted in Gruening (2001), transcending the politics-administration divide was the main reason for corruption, maladministration, nepotism, and poor performance in the American public service in the 19th Century. This shows that the rampant corruption, nepotism, and poor performance that defines South African municipalities is a reflection of the administrative problems that characterised the American public service before its transition from politicised bureaucracy to a hybrid model that includes an independent and professional civil service and a few political appointments. As was the case in the American public administration, this study found out that corruption is rampant in South African municipalities. Linking corruption to democratic centralism, Mantzaris and Pillay (2014) associates corruption in South African municipalities with the ANC Polokwane Elective Conference of 2007 that placed the ANC as the centre of power. This means that the ANC dictates on what its cadres in government should do. Therefore, the resolutions of the Polokwane conference firmly placed tendencies of democratic centralism at the centre of government administration. Highlighting one such tendency, Maqoko (2015) posits that the ANC Regional Executive Committee in Eastern Cape instructed the recruitment panel to appoint a far less qualified and experienced person than any of the other candidates the panel had shortlisted for the position of a Municipal Manager in one Municipality.

Direct interference in the appointment of senior municipal officials is an indication that cadre deployment has eroded accountability mechanisms. Therefore, this paper concurs with Shava and Chamisa's (2018) assertion that political interference has weakened human resource practices in municipalities. It further agrees with Moeti (2014) that political interference has created opportunities for corruption and nepotism. Thus, the paper defines nepotism as one of the main service delivery impediments because it has created a culture where politicians appoint their friends and relatives to positions for which they do not qualify. This means that nepotism leads to a shortage of critical skills required for effective delivery of services within South African municipalities. Nepotism is not limited to appointment of staff but extends to promotions and staff development. As the findings of this study revealed, nepotism has affected staff morale because hardworking professionals are overlooked for promotions and staff development opportunities. While nepotism is at the heart of cadre deployment, it is important to note that the ANC had long resolved to guard against nepotism in its implementation of cadre deployment policy (Twala, 2014). Therefore, the rampant nepotism reported in different studies and corroborated in this paper is a clear indication that the ANC has failed to implement its resolutions. As De Jager and Steenekamp (2015) point out, the ANC has moved away from its founding principles of accountability and has adopted an inward looking and self-serving behaviour. This paper argues that this behaviour has paralysed service delivery across all spheres of government.

Last, the study results revealed lack of trust between politicians and career public servants in municipalities. This paper attributes this problem to bluntant disregard of established human resources principles for political expediency. As the results pointed out, political meddling in administrative affairs creates a perpetual state of conflict between public officials and politicians. This means that more time is spent on addressing conflicts rather than focusing on service delivery.

7. Conclusion

In sum, this paper traced the origin of democratic centralism back to Marxism and argued that it has entrenched politicised bureaucracy in South African municipalities. In addition, the paper presented cadre deployment as an instrument through which the ANC dispenses patronage and nepotism to the detriment of service delivery. In this regard, the paper outlined corruption, nepotism, and lack of accountability as key manifestations of poor performance in South African municipalities. Most importantly, the paper argued that these challenges are similar to administrative problems that engulfed the American public administration in the 19th Century. For this reason, the paper advocates for a complementary administrative model that embraces an independent and professional public service while retaining political appointments to enable political parties to implement their programmes in government. However, as noted in advanced democracies such as the United States, successful implementation of such a model rests on a strong political will to instil a culture of performance and accountability at the local government level. A recommendation for adoption of a complementary model is indicative of the impracticality of the politics-administration dichotomy not only in South Africa but also in advanced democracies such as the United States, which recognises the distinct contribution of political office-bearers and public servants to the democratic process. This recommendation comes against the author's concurrence with Mafunisa (2003) that South Africa requires a politicised model to redress the imbalances of the past discriminatory policies and practices.

References

- Alexander, P. (2010). Rebellion of the poor: South Africa's service delivery protests: A preliminary analysis. *Review of African Political Economy*, 37(123), 25-40.
- Angle, S. (2005). Decent democratic centralism. *Political theory*, 33(4), 518-546.
- Bartholomew, P. (1972). *Public Administration*. Littlefield: Adams & Co.
- Bernard, H. (2006). *Research Methods in Anthropology: Qualitative and quantitative methods (4th ed.)*. Oxford: AltaMira Press.
- Bless, B.D. (2023). Using organisational culture to derive performance improvement model for Tshwane Metropolitan Municipality. Doctoral Thesis, Wits University, Johannesburg
- Boddy, C. (2005). Sample size for qualitative research. *Qualitative Market Research*, 19, 426-432.
- Charmaz. (2014). *Constructing grounded theory*. London: Sage.
- Chen Tie, Y.C., Birks, M. and Francis, K., 2019. Playing the game: A grounded theory of the integration of international nurses. *Collegian*, 26(4), pp.470-476.
- Cloete, F. (2009). Evidence-based policy analysis in South Africa: Critical assessment of the emerging government-wide monitoring and evaluation system. *Journal of Public Administration*, 44(2), 293-311.
- De Jager, N., & Steenekamp, C. L. (2016). The changing political culture of the African National Congress. *Democratization*, 23(5), 919-939.
- De Visser, J., & Akintan, O. (2008). Institutional Tensions between Municipal Chairpersons and Executives - Speaking of Mayor Conflicts? *Community Law Centre*.
- Govender, K. K., & Ramodula, T. (2020). A review of the evolution of the local government system in South Africa: towards developmental local government. *Journal of Public Value and Administrative Insight*, 3(3), 50-65.
- Gruening, G. (2001). Origin and Theoretical Basis of New Public Management. *International Public Management Journal*, 1-25.
- Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. Denzin, & Y. (. Lincoln, *Handbook of qualitative research* (pp. 105–117). Sage Publications, Inc.
- Guetterman, T. (2015). Descriptions of sampling practices within five approaches to qualitative research in education and the health sciences. *Forum: Qualitative Social Research*, 16(2), 1-24.
- Gumede. (2015). Administrative culture of the South African public service: A finity of transformation. *Journal of Public Administration*, 50(3), 589-599.
- Kariuki, P., & Reddy, P. (2017). Operationalising an effective monitoring and evaluation system for local government: Considerations for best practice. *African Evaluation Journal*, 5(2), 1-8.
- Kgatle, M. (2017). The causes and nature of the June 2016 protests in the city of Tshwane: A practical theological reflection. *Theological Studies* 73(3), 1-8.
- Lamidi, K. (2015). Theories of public administration: An anthology of essays. *International Journal of Politics and Good Governance*, 6(6.3), 1-35.
- Mabin, A. (1992). Comprehensive segregation: The origins of the Group Areas Act and its planning apparatuses. *Journal of Southern African Studies*, 18(2), 405-429.
- Madumo, O. (2016). De-politicisation of service delivery in local government: Prospects for development in South Africa. *African Journal of Public Affairs*, (9), 3, 81-94.
- Mafunisa, M. (2003). Separation of politics from the South African public service: Rhetoric or reality? . *Journal of Public Administration*, 38(2), 85-101.

- Makole, K. (2022). From Cadre Deployment to Professionalizing Public Service in South Africa: A Reflective Approach to Service Delivery Improvement. *African Journal of Development Studies*, (1), 21, 21-38.
- Mamokhere, J. (2021). Evaluating the Impact of Service Delivery Protests in Relation to Socio-Economic Development: A Case of Greater Tzaneen Local Municipality, South Africa. *African Journal of Development Studies*, 2021(si1), 79-96.
- Maqoko, Z. (2015). *The political and administrative interface on the local government sphere - Nelson Mandela Bay Municipality*. Gqeberha: Nelson Mandela Metropolitan University.
- Masiya, T., Davids, D., & Manga, M. (2021). Factors affecting the performance of South African municipal officials: Stakeholders' perspectives. *Commonwealth Journal of Local Governance*, 25, 97-115.
- Mathebula, N. (2018). Integrated Development Plan Implementation and the Enhancement of Service Delivery: Is There a Link? *The 3rd Annual International Conference on Public Administration and Development Alternatives* (pp. 1-9). Stellenbosch : University of Stellenbosch.
- Marais, D. (1989). *South Africa: Constitutional Development – A Multi-disciplinary Approach*. Johannesburg: Southern Books.
- Mlambo, V. H., Zubane, S., & Thusi, X. (2022). Interrogating Governance Challenges and Cadre Deployment in South Africa. *Erbil Journal of Humanities and Social Sciences*, (VI), 2, 1-8.
- Mngomezulu, S. (2020). Political Interference in the Administration of Service Delivery in UMLALAZI Local Municipality of KwaZulu-Natal, South Africa. *Journal of Economics and Behavioral Studies*, (12)1, 38-45.
- Moeti, K. (2014). *Public finance fundamentals, 2nd edition*. Cape Town: Juta.
- Morgan, J. (2015). Marxism–Leninism: The Ideology of Twentieth-Century Communism. . In J. Wright, *International Encyclopedia of the Social and Behavioral Sciences, 2nd edition* (pp. 656–662). Elsevier: Oxford.
- Morse, J. M. (1994). Designing funded qualitative research. In N. K. Denzin, & Y. S. Lincoln, *Handbook of qualitative research (2nd Ed)*. Thousand Oaks, CA: Sage.
- Ndevu. (2019). Trust and organisational performance: A grounded theory approach for a South African district municipality. *Journal of Human Resource Management*, 17(1), 1-11.
- Ndevu. (2022). Rethinking Performance Management: Realities in South African Municipalities. In D. Dias, & C. Magalhães, *People Management-Highlighting Futures* (pp. 1-22). IntechOpen.
- Ndevu, Z., & Muller, K. (2018). A Conceptual Framework for improving service delivery at local government in South Africa. *African Journal of Public Affairs*, 10(4), 181-195.
- Nzimakwe, T., & Ntshakala, T. (2016). Implementing performance management in local governance in South Africa: A case study of West Rand District Municipality. *African Journal of Public Affairs*, 9(1), 110-122.
- Pretorius, D., & Schurink, W. (2007). Enhancing service delivery in local government: the case of a district municipality. *SA Journal of Human Resource Management*, 5(3), 19-29.
- Rosenbloom, D. (2008). The politics–administration dichotomy in US historical context. *Public administration review*, 68(1), 57-60.
- Sekaran, U., & Bougie, R. (2009). *Research Methods for Business: A skill Building approach, 5th Edition* . West Sussex: Wiley & Sons.
- Shava, E., & Chamisa, S. (2018). Cadre Deployment Policy and its Effects on Performance Management in South African Local: A Critical Review. *Politeia*, (37), 1, 1-8.
- Strass, A., & Corbin, J. (1998). *Basics of qualitative research: Grounded theory procedures and techniques (2nd ed.)*. Thousand Oaks, CA: Sage.
- Strauss, A. (1987). *Qualitative analysis for social scientists*. New York: Cambridge University.
- Suttner, R. (2003). Culture(s) of the African National Congress of South Africa: Imprint of Exile Experiences. *Journal of Contemporary African Studies*, 21(2), 303-320.
- Tsatsire, I., Raga, K., Taylor, J., & Nealer, E. (2009). Historical overview of specific local government transformatory developments in South Africa . *New Contree*, 57, 129–148.
- Twala, C. (2014). The African National Congress (ANC) and the Cadre Deployment Policy in the Post-Apartheid South Africa: A Product of Democratic Centralisation or a Recipe. *Journal of Social Science*, 41(2), 159-165.
- Van Riper, P. (1987). The American administrative state: Wilson and the founders. In R. Chandler, *A centennial history of the American administrative state* (pp. 3–36). New York: The Free Press.

BE FAIR: A Qualitative Investigation of pay Inequity Experiences

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Abstract: This study explores the topic of pay inequity, with a particular focus on how it impacts on women working in the UK today. Theoretical and methodological gaps exist across the literature, which to date have focussed on quantitative approaches to hypothesis connected to (i) equity theory (Adams, 1965; Homans, 1958), (ii) the gender pay gap (Olson, 2013; Metcalf, 2009; Rubery, 2015) and (iii) equal pay law (The Equal Pay Act, 1970). This study seeks to address these gaps by taking a feminist and qualitative approach to the collection of narratives that describe the lived experience of female pay inequity victims. Semi-structured interviews are used to collect the rich narratives and unique perceptions of women who have experienced this phenomenon for themselves, and provides us with deep insights into the events, behaviours and perceptions that surround their experiences (Blaikie, 2007; Oakley, 1981). This paper provides justification for the methodological approach, and how it has been used to address the gaps in our knowledge that are preventing the theoretical advancement of the topic. As this study is currently in the data collection and analysis phase for a PhD project, no findings are presented in this paper.

Keywords: Pay Inequity; Equal Pay; Women; Qualitative; Gender; Feminist.

1. Introduction

This study aims to provide a new perspective on the topic of pay inequity and how it is experienced by women working in the UK. The paper provides a summary of the current landscape, and how we have historically approached the topic of pay inequity, before highlighting the knowledge gaps that exist and how this study has been designed to tackle them (Burke, 2022). The methodology section comprises the main content of this paper, which seeks to justify the qualitative approach (Golden-Biddle and Locke, 2006), and feminist standpoint (Blaikie, 2007; Oakley, 1981), as relevant and appropriate to the study. Due to the novel approach taken to the research, the author has provided examples of how the author will present her findings, before concluding on the paper. The discussion section will consider the impact of the research, and challenge the existing research methods community for their critiques, ahead of completing the analysis of the data for this project. The author has conducted 9 interviews so far, resulting in nearly 20 hours of audio-visual files which she is part way through transcribing. Alongside the transcription, the author has begun the analysis of the data from a qualitative perspective which is helping to shape the storylines and plots that will become part of the findings paper for her PhD thesis which is expected to complete in 2024.

The author provides a diagram or schema view of the research landscape (Figure 1) to support the readers understanding of how research currently falls into the three main perspectives (societal, organisational and individual).



Figure 1: Schema-view of pay inequity research.

1.1 Existing Pay Inequity Research

Historically pay equity research has been associated with the broader social justice theories since the emergence of Homans' distributive justice theory in 1958 (Homans, 1958). Answering Homan's call for empirical evidence, Adams et.al hypothesized and tested for cognitive behaviours driven by homogenous responses to pay inequity situations and giving rise to equity theory in the mid-1960s (Adams, 1965; Walster and Walster, 1975, Leventhal, 1980), before reaching a theoretical 'black hole' towards the end of the last decade, that had already been considered as early as the 1978 by Carrell and Dittrich. In this paper they question the assumption of an homogenised response to injustice, and call for a critical realist approach explaining how pay inequity is

experienced out in the real world (Carrell and Dittrich, 1978). Cropanzano et.al in 2011 shed a fresh perspective on responses to social injustice that broadens the theoretical remit of the topic. Providing an analysis of research that connects this type of injustice to an emotional affect, and thereby rejecting the phenomenon as driving cognitive responses alone (Cropanzano et. al, 2011). Progress within the social psychology space has since been stunted, giving way to research on the UK's gender pay gap reporting and equal pay law (Thornburg, 2019).

Quantitative research and analysis of the Gender Pay Gap reporting interventions has dominated the UK's journal article landscape since the Office for National Statistics (ONS) began reporting it in 1998 (ONS, 2023), with nearly two thirds of all articles published in the UK focussing on this data. A variety of structural causes for the gap have been established through this research (Rubery, 2017); but the data sources have been problematic; which has hindered our ability to generate substantive theory, as well as develop any testable hypothesis or meaningful interventions to take forwards within academia or across our organisational practices (Sharkey, et.al., 2022). Perhaps not surprisingly, research on the efficacy of the UK's equal pay laws were delayed for over 50 years since its enactment in 1970, this being despite hundreds of thousands of tribunal court cases flowing through the courts. However, upon closer inspection of the literature as can see that the complexity, length and expense of such cases have meant that we are only just beginning to shed some academic light on our legal practices; which are already beginning to expose the very similar barriers to equity that women experience when entering the UK's tribunal court system, as they do when entering the world of work (Thornburg, 2019). There has, however, been some consensus across this research community that these research efforts have been siloed and fragmented. The research thus far tells of a homogenisation of our cognitive responses to pay inequity, which can be empirically tested using hypothetical scenarios (Adams, 1965; Walster and Walster, 1975, Leventhal, 1980). Here we see 3 gaps emerge:

- Perspective - Women
- Theoretical – The lived experience
- Methodological - Qualitative

2. Methods

As we consider the broad body of literature that surrounds organisational theory, we can see that pay inequity research shares some important characteristics with other methodological approaches within the business research community. Demonstrating a preference for empirical research, using a quantitative methodology, that focuses on the creation and testing of hypotheses in our search for universal truths. For the researcher whose aims might be in establishing the facts, or truth, of given theory; this approach is entirely relevant and appropriate; however, this same approach can be problematic when faced with the challenge of developing new theory, or gain deeper insights, into the lived experiences of a particular phenomenon, such as pay inequity (Ritchie, et al., 2014). We must, then, consider how to adopt a new approach to research that embraces the use of different methodologies; methodologies that may be unfamiliar to the existing research community, but relevant and appropriate to the study in question. Knowledge development here could be considered an incremental process, that strives to build on what has gone before, and yet still allows for researchers to take entirely new approaches, that seek to explore new avenues to advance theoretical development, yet still continue to drive our knowledge forwards. Different methodological approaches can alienate individual researchers, and even divide research communities, which is not the intention of this paper. Therefore the main purpose of this paper will be for reviewers to primarily consider (1) whether this approach is appropriate for the specific topic of interest – pay inequity as experienced by female victims in the UK. Although there could be a further discussion prompted by this paper regarding the need for us to create more space for how we might use similar feminist and qualitative approaches to better understand female experiences within the workplace.

2.1 Research Approach

As qualitative researchers we focus on building a bridge between the world of academic theory, and the experiences of individual agents out there in the world of business. This work involves the careful articulation of theoretically relevant insights that have been gathered directly from the lived experiences of individuals, either through observation or, as in this case, through the use of rich and descriptive narratives that serve to deepen our understanding of the business world and the agents working within it (Bartos, 1986). Business research has additional layers of complexity, when we consider the cultures, practices and behaviours that surround the organisation (Sathe, 1983; Schein, 1983a), and therefore a qualitative approach could help us to understand how

these factors interact to create the unique experience of individuals operating within the organisation as shown in *Figure 2*. In contrast to the ‘fact finding’ approaches found in quantitative methodologies, here we will present a qualitative approach that seeks to illuminate our understanding of the specific interactions that exist between women who experience pay inequity, and the organisations that have treated them unfairly (*Golden-Biddle and Locke, 2006*). This approach therefore rejects the positivist notion that there is an ‘objective reality’ that is experienced in the same way by everyone (*Ritchie, et al., 2014*). Instead, the author seeks to gain theoretical insights from the rich and deep narratives of those women who experienced pay inequity for themselves. Bringing into focus the narratives of individual women from across a variety of industry sectors, so that they can share their unique perspectives of the organisation, events and responses that were integral to their personal experiences of pay inequity (*Ritchie, et al., 2014*). A grounded theory approach to the analysis of this unique dataset will be used to plug the perspectives gap in our knowledge identified earlier so that we can seek to connect these insights to the existing literature and beyond (*Glaser and Strauss, 1968*).

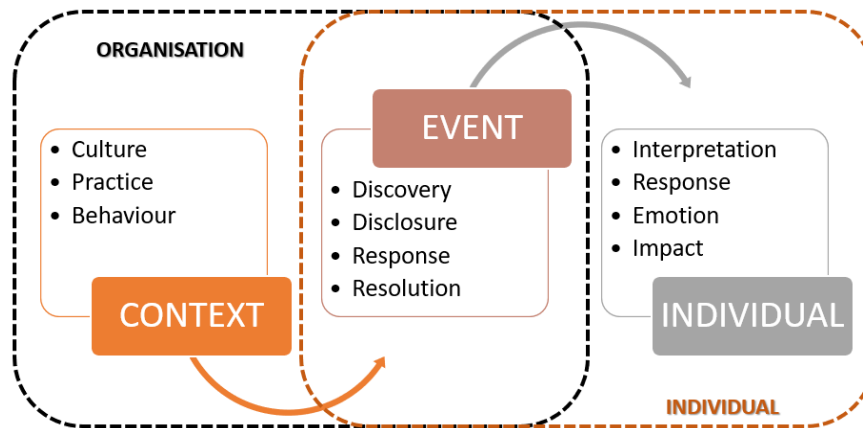


Figure 2: Pay Inequity – Organisation and Individual Interactions

Traditional research methodologies have been built upon a masculine paradigm that seeks to gather data to assimilate facts about a given phenomenon. The objective and emotionally distant male researcher has been the character most frequently displayed in business research methodology books, who will gather information and remain objective and distant to interviewees, so as to prevent accusations of biases (*Roberts, 1997*). The adoption of such masculine approaches to research, and then using these techniques to interview women about experiences that are related to their gender, is problematic. This study will only interview female participants, describing their personal experiences of a uniquely female phenomenon (pay inequity as experienced by women), as interviewed by a researcher who has also experienced pay inequity in the workplace. The author has therefore reconsidered her approach to the data collection, so that it is sensitive to the needs of the participants, and relevant to the context of the study. Traditional approaches to semi-structured interviews that create an objective and hierarchical relationship between the interviewer and interviewee is an inauthentic way for this research to be conducted. Interviewees must be in control of their own stories or narratives, and trust the interviewer to tell their story in their own words, otherwise the process could be construed as exploitative and judgemental (*Roberts, 1997*). The author’s own experiences pay inequity have shaped the research design and approach, resulting in two complementary roles; (1) the role of supportive fellow victim, and (2) the role of non-judgemental researcher. Ultimately a feminist, empathetic and supportive approach has been successfully adopted throughout the data collection process, which has aided in building the necessary rapport and trust with each female victim who have decided to share their story.

2.2 Data Collection

A 30 minute to 1 hour Introductory session is held with each potential participant to understand whether their experience meets the criteria of the study, as well as to explain the study, interview process and to build rapport. This approach focusses on retaining supportive relationships with each participant, and helps ensure that an empathetic and supportive environment can be created for the interview itself, being sensitive to the needs of the storyteller, and the environment that will put her at ease. It is essential that there are high levels of trust between the researcher and participant throughout the story-telling process, as this can be helpful to women who need to tell their stories without fear of being misrepresented or judged.

Most of the interviews conducted so far have been online due to the restrictions imposed by the Covid 19 lockdown restrictions imposed across the UK during 2020 onwards, with full video recordings for each interview resulting in the transcription of around 20 hours of data across 9 interviews so far. Although more problematic from a rapport-building perspective this has allowed for the scheduling of interviews at convenient times to the participant, and usually within the comfort of their home environments.

In-depth semi-structured interviews are used to capture the narratives of women to allow for some consistency to the flow and structure of the transcription data across the study. Open ended questions are used as prompts throughout the story telling process, with participants providing some contextual information about the company, industry and teams they worked with prior to starting their story at the beginning (discovery) and then being guided through the phases of disclosure, response and resolution as shown in *Figure 5*. Each interview will typically last around 2 hours, and are conducted informally and in a comfortable environment, reflecting a conversation rather than an interview, but with the participant in control of the narrative, and will be encouraged to tell their story using their own language. This allows for the capture of individual perceptions of the events, responses and emotions pertaining to the whole experience, as well as any relevant reflections or sense-making at the time, and afterwards.

2.2.1 Participant Selection

Due to the secrecy that continues to surround employee pay data, finding women who are aware of any pay inequities can be problematic, and will therefore be limited to those women who have discovered the injustice by accident, either by unwitting colleagues, or Human Resource (HR) errors. This means that even if women suspect that they are being undervalued, they are not able to prove this without confirmation from the organisation, and requiring a legal process for the data to be disclosed. This study will therefore need to seek out women who have discovered pay inequity, reported it to their employers, and then also started legal proceedings so that they have received confirmation of the pay inequity. These women's pay inequity experiences are kept secret at the organisational level (senior management and HR), and any associated 'pay corrections' that happen are accompanied by a non-disclosure agreement (NDA) to prevent employees alerting their fellow employees to the problem, and thereby potentially triggering a barrage of claims, such as we have seen with the hundreds of women with outstanding claims against the BBC (*Benjamin, 2018*). It is therefore only those women who decide to take their employers to a tribunal court, and hold a public hearing, that become visible to the general public, that become possible participants for the study. In addition, the author has reached out to a number of charitable women's organisations that have access to women with pay inequity issues, which has allowed for a snowballing approach to connecting with women that have had pay inequity experiences, and crucially, are also willing to share their story. This has meant that so far each potential participant meets the criteria of having experienced the whole process (from discovery to litigation) and can therefore answer the questions developed for the study as outlined in *Figure 4*. A broad cross-section of women with differing types of experience-levels, ages, ethnicities and seniority and from across a wide spectrum of industry sectors have so far come forwards to tell their story.

Current job title (or most recent)	Current (or most recent) industry sector	Age range
Managing Director	Professional Services	36 - 45
Chief Executive	Food manufacturing	46 - 55
Sales Specialist Team Leader	Telco	36 - 45
Head of Product	Broadcasting	36 - 45
Microbiology Business Support Manager	NHS	46 - 55
Co-ordinator NHS	Public	56 - 65
Senior Pricing and Proposition Manager	Telco	26 - 35

Figure 3: Participant information: Job title, sector and age

2.2.2 Ethical considerations

There are universal ethical rules and values that apply to the approach and engagement of possible participants for a study of lived experiences, which are considered alongside some additional responsibilities such as recognising that pay inequity experiences can lead to a workplace trauma that can have a lasting impact on the mental well-being of women. The author feels a responsibility towards providing a voice that will speak to the

experiences of the female victims of pay inequity in the UK, and believes that each story has a right to be heard. I have also found that I have been willing to share my own experiences with participants where appropriate in order to demonstrate empathy, and support participants through the telling of their own stories. This study design and approach has been ethically approved by the Kingston University ethics committee.

2.2.3 Interview Questions

In order to address the perspective (women) and theoretical (lived experience) gaps that have emerged from the literature review, this study has been designed to capture the narratives of women who discovered that they were being paid unfairly. A qualitative approach supports the data collection activities through the use of semi-structured interviews; which will provide a rich narrative of the lived experience of female pay inequity victims. This data capture includes narratives which describe how and when the pay inequity was initially discovered, what happened once this was disclosed to the business, and any responses they observed in themselves and others throughout their experience. Finally questions about the impact that the experience has had, and continues to have, on these women's lives and careers will help to provide insight into the female perspective on this phenomenon, and how such experiences can reshape our thoughts, attitudes, and behaviours towards society, the organisation and other individuals. A summary of the interview questions framework is included as Figure 4.



Figure 4: Interview Question Framework: Pay Inequity phases linked to interview questions.

2.3 Data Analysis

Nine interviews have been conducted so far which confirmed that the data collection and analysis phases can be conducted in parallel, as we will see from the findings section below. Deep insights and theoretical perspectives are already emerging from the rich narratives that are being collected, and therefore we can see that the grounded theory process has already begun for this project (*Glaser and Strauss, 1968*). Interviews are transcribed in full before being upload into the thematic analysis software NVivo (*NVivo - Lumivero*). Each interview is transcribed manually as soon as possible after the interview to support familiarity of the research with the data, as well as ensure the 'steady flow' of data through the NVivo system to support the emergence of themes as per the ground theory development approach (*Glaser and Strauss, 1968*). The majority of challenges associated with this approach to analysis will be surrounding in the interpretation of the data, not least because the author has her own experiences of the phenomenon and may therefore influence the findings that emerge from the analysis phase of the project. Mechanisms to preserve the specific language and descriptors used by participants will be implemented throughout the transcription and analysis process to ensure that the results remain true to participants own words and voices (*Glaser and Strauss, 1968*). The author will refrain from linking the findings back to existing theory or concepts too early in order to avoid fitting any potentially new substantive theory development into 'old theoretical boxes', and thereby enabling a phenomenologist approach (*Richie et al, 2014*).

2.3.1 Consideration of the risks associated with the research analysis

Risks to this analysis approach fall mainly into two categories; (1) risks associated with the authenticity and interpretation of the data, and (2) risks associated with the emergent nature of the findings which could lead to unforeseen gaps in the data collection process. In addressing the first risk we can see that as a woman, and as a victim of pay inequity, there exists a strong connection between the researcher, and data associated with this study. Although this could result in those parts of the data that echo the experiences of the researcher becoming more prominent in the findings presented; there is, however, a greatly reduced risk in the researcher missing the underlying meaning of what is being expressed by the participants through the description of their own experiences, and emotions. This risk is also diminished by the grounded theory approach itself, where new insights are expected to ‘emerge’ from the data, rather be forged from preconceived ideas in the researcher’s mind. In addition, appropriate presentation of the findings can also reduce this risk by linking every substantive theory statement to actual accounts provided across the data (Richie et al, 2014). With regards to the risk of unforeseen gaps, the authors are satisfied that the interview approach and questions adequately cover the range of experiences that participants face in relation to this phenomenon. The author’s own experiences and the use of a set of pilot interviews has also eradicated the need for any major rework to the research questions or approach used thus far.

3. Findings

3.1 Structure of the findings

The presentation of the findings from this study will follow qualitative approaches that will primarily consider the academic audience; however, we must also consider that these findings could contain important insights that may influence our practices around pay inequity situations within the organisation. It will therefore be necessary to ensure that the richness and complexities of the findings are readily accessible and understandable to both sets of audiences. Adopting a qualitative approach to the research leads us as authors to consider imaginative ways to present the findings in a way that can be understood by the readers, such as the theorised storyline approach (Golden-Biddle and Locke, 2006). As the grounded theory process has already begun, so too has the theorised storyline development, leading the author to begin to develop a framework for presenting the findings in the form of a story as shown in Figure 5.

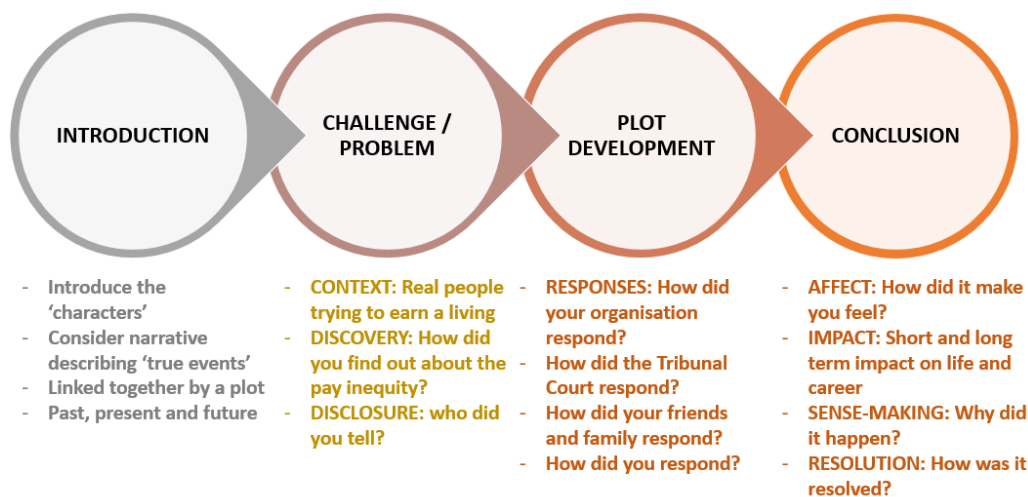


Figure 5: Theorised storyline adapted from Golden-Biddle and Locke, 2006

3.2 Presentation of the results

Rich insights emerge from the data which will illuminate our understanding of the specific events and perceptions that surround the pay inequity experience. Substantive theory will emerge from the complications and perceptions that we are guided to by our narrators, combined with the authors own personal experiences to provide readers with insights into the phenomenon (Golden-Biddle and Locke, 2006). A careful display of insights alongside the narratives will aim to take readers through the grounded theory process, whilst also connecting the narratives to any substantive theory development, knowledge claims, or existing concepts or

theories where they may already exist. Some examples have been taken from the actual transcripts part participants in this study in order to illustrate how this data will be presented within the finished article (Figure 6,7 and 8):

Recognition of power structures are implicitly understood by employees, which are not written down, but are perceived through the actions and behaviours of others:

“So there seemed to be as a kind of a unwritten set of unwritten rules which you were expected to abide by as graduates, and the managers had ultimately power over you and could determine your career there.”

Figure 6: Example of presentation style for qualitative (taken from participant transcription data).

In addition, the author will consider how metaphors have been used by participants within their narratives, or how these could be used more broadly across the data, to support and aid the understanding of readers (Golden-Biddle and Locke, 2006). An example of the participants use of metaphor is provided below:

Here we can consider organisational inaction around employee perceptions of ‘bad behaviour’ (in this case sexist and racist comments). The ‘bad apple’ metaphor has been used to explain that if an individual’s discriminatory behaviour is not deal with, it can spread to the rest of the team; and therefore impacting on the behaviours of the whole team. This metaphor describes how one bad apple, can cause the whole apple cart to rot prematurely if not removed:

“To me that if they notice a bad behaviour and they don't deal with it. That should be the repercussion. You'll have bad apples in every place, but like they should deal with that. But they don't, you know, they just don't for the most part in my opinion.”

Figure 7: Example of use of metaphor as taken from participant transcription data.

An example of how we might link the data to existing concepts that relate to the topic area has been used below to illustrate how such findings will be presented within the final research paper.

Many employees are not aware of the prevalence of pay inequity experiences due to the success of non-disclosure agreements to silence employees from talking about it. This silence supports the ‘gas-light’ effect that can characterise the organisational response to the problem. Here we can see the impact that meeting others with a similar experience can have on validating responses experienced by victims:

“When you talk to other people and you realise, oh, I'm not crazy and you start sharing experiences, you realise like there's a pattern, you know”

Figure 8: Linking data to existing concepts across the topic area (taken from participant transcription data).

The findings will initially be constructed as per the phases that have emerged from the initial research design as outlined above (context, discovery, disclosure, response, and resolution). This will ensure that readers can follow the normal continuum present in the story-telling process, i.e. that of the past, the present and the future. The ‘resolution’ element of each narrative can help us to understand what might have changed for the individual as a result of their pay inequity experiences, these can help us to understand the ‘endings’ to story. As the story flows from the discovery of the pay inequity, through the efforts that are made to put the pay inequity right, and into how this experience has fundamentally changed the lives and careers of those women impacted (Golden-Biddle and Locke, 2006), we can discover both the short-term and long-term affect that this type of social injustice is having on women, as well as describe or potentially explain any patterns that may present themselves from the data. The author hopes to provide a framework that references the perceptions and experiences that accompany pay inequity experiences, identifying areas for substantive theory development, that can provide us with a focus for our future research efforts.

4. Discussion

Every researcher and author is driven by the desire for their research to have an impact on the real world, which can also provide an opportunity for broader communities of researchers, practitioners and even the general public to become interested in the topics that we study. Generating a deeper understanding, or simply providing an awareness of a phenomenon, can help to bring debates into focus that may otherwise remain silent or outdated. For centuries decisions on where our curiosity can wander, and how we can come to 'know' this world and each other, have been driven by the biases of the patriarchal foundations upon which our society has been built. This has limited the exploration of specific types of phenomena, as well as diminished or silenced the voice of female perspective. This paper questions the ontological assumption that our experiences of the world are the same, and presents an alternative methodological approach which embraces the idea that our experience of the world is uniquely created from the events, behaviours and perceptions that qualitative research has been designed to capture. This study therefore does not only address the gaps in the literature, but also seeks to redress the imbalance of perspectives that has emerged from society's historical biases.

This study is as ambitious in its methodological approach, as it is in its expected impact. There is a great deal of responsibility that comes with the collection and representation of personal stories, particularly those that may impact how we come to understand the phenomenon, and influence the future research and practices affecting future generations of women workers. This research approach has been specifically designed to be respectful to the time and energy that the retelling of personal stories require; and mindful that, for some, this process has involved the recall of painful memories and emotions. Every participant so far has sincerely expressed their desires for this research to produce some meaningful insights that can help the academic and practitioner world move forwards on this topic. Whether through new theory development, or through new policies or interventions, that can help to prevent other women from experiencing the type of harm they have experienced throughout their ordeals both within the workplace and through the UK courts. Change does not happen by individuals acting on their own, but as communities and experts coming together to prioritise all forms of discrimination, particularly those that cause lasting harm, and perhaps we are now capable of finding ways to protect our children from the inequity that women have suffered for generations.

References

- Adams, J.S. (1965) 'Inequity in social exchange', in *Advances in experimental social psychology*. Elsevier, pp. 267-299.
- Bartos, R. (1986) 'Qualitative research: what it is and where it came from', *Journal of Advertising Research*, 26(3), pp.RC-3.
- Benjamin Kentish (2018) BBC gender pay gap: 170 female employees demand apology over salary differences and 'culture of discrimination'. Available at: <https://www.independent.co.uk/news/uk/politics/bbc-gender-pay-gap-employees-apology-bbc-women-nuj-tony-hall-select-committee-a8184306.html> (Accessed: 20th July 2020).
- Blaikie, N. (2007) *Approaches to social enquiry: Advancing knowledge*. Polity.
- Burke, R. 2023, *Pay Inequity: Past, Present and Future* (unpublished).
- Glaser, B. and Strauss, A.L. (2017) *The discovery of grounded theory : strategies for qualitative research*. London, England] ; New York, New York: Routledge.
- Golden-Biddle, K. and Locke, K. (2006) *Composing qualitative research*. 2nd edn. London: SAGE.
- Homans, G.C. (1958) 'Social Behavior as Exchange', *American Journal of Sociology*, 63(6), pp.597-606. Available at: <https://dx.doi.org/10.1086/222355>.
- Metcalfe, H. (2009) *Pay gaps across the equality strands: a review*. Equality and Human Rights Commission Manchester.
- Moore, S. and Tailby, S. (2015) 'The changing face of employment relations: equality and diversity', *Employee Relations*, 37(6), pp.705-719. Available at: <https://dx.doi.org/10.1108/ER-06-2015-0115>.
- Oakley, A. (1981) 'Interviewing women: A contradiction in terms', *Doing Feminist Research*, 30(6), pp.1.
- Olson, J. (2013) 'Human Capital Models and the Gender Pay Gap', *Sex Roles*, 68(3-4), pp.186-197. Available at: <https://dx.doi.org/10.1007/s11199-012-0208-5>.
- Ritchie, J. et al. (2014) *Qualitative research practice : a guide for social science students and researchers*. Second edition / [edited by] Jane Ritchie, Jane Lewis, Carol McNaughton Nicholls, Rachel Ormston.. edn. Los Angeles : SAGE.
- Roberts, H. (2013) *Doing feminist research*. Routledge.
- Roberts, H. (1997) *Doing feminist research*. London: Routledge.
- Rubery, J. (2017) 'Why is Women's Work Low-Paid? Establishing a framework for understanding the causes of low pay among professions traditionally dominated by women', .
- Sathe, V. (1983) 'Implications of corporate culture: A manager's guide to action', *Organizational Dynamics; Organ Dyn*, 12(2), pp.5-23. Available at: [https://dx.doi.org/10.1016/0090-2616\(83\)90030-X](https://dx.doi.org/10.1016/0090-2616(83)90030-X).
- Sharkey, A., Pontikes, E. and Hsu, G. (2022) 'The Impact of Mandated Pay Gap Transparency on Firms' Reputations as Employers', *Administrative Science Quarterly*, 67(4), pp.1136-1179. Available at: <https://dx.doi.org/10.1177/00018392221124614>.

The Office for National Statistics, (ONS) (2023) The Gender Pay Gap Report. Available at:
<https://www.gov.uk/guidance/gender-pay-gap-reporting-overview> (Accessed: 16th March 2023).
Thornburg, E. (2019) '(Un)Conscious Judging', *Washington and Lee Law Review*, 76(4), pp.1567-1665.

Business Research Methods: A Perspective of Street Traders in the Informal Economy

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Abstract: Many people, despite being educated or not, struggle to find decent jobs in the formal economy. Some end-up working in the informal economy as self-employed/own-account workers. Informal economy is the largest employer with more potentials, employing approximately 61 percent of the global labour force. Despite different forms of occupations, street trading is the most visible occupation in the informal economy. There is a research gap between formal and informal economy, with most research done in the formal economy. It is recommended that micro-level individuals must be included in research to broaden knowledge. The informal economic activities are not reported in government statistics. It is odd because the informal economy is the largest global employer and street trading is found in both developed and developing economies. Informal economic activities are however associated with lack of growth and social security, money laundering, and financing of terrorist activities. The study was conducted to determine work engagement of street traders using the Utrecht Work Engagement Scale (UWES). The UWES is validated and used for quantitative studies in the formal economy. The instrument was pretested and piloted for quality appraisal purposes for validation and use in the informal economy. The general lack of credible records of street trading activities, makes it difficult for researchers to conduct studies using different methodologies in the informal economy. The convenience sampling strategy, a nonprobability sampling strategy, was used in choosing participants, and was most valid for solving the problem of the study, choosing participants accidentally on availability. Most quantitative studies involving street traders are restricted to using nonprobability sampling, which is a concern. The high birth and/or mortality rate of street trading businesses make the database inconsistent to use as some do not report when exiting or entering. The lack of credible records/database of street trading activities, and over reliance on nonprobability sampling strategy, restrict the holistic generation of knowledge. The street traders' activities must be registered to develop from knowledge generated through research.

Keywords: Informal economy, research methods, sampling methods, self-employed or own-account workers, street traders

1. Introduction and background

Doing research in the formal economy provides plenty of research methodology choices compared to fewer choices available in the informal economy. Most of the activities in the informal economy are not registered, or recorded and production does not feature in reported government statistics (Potts, 2008). The percentage of the labour force in the formal economy is far less than that in the informal economy (ILO, 2022). The formal sector is structured, database of records is available, and other resources from which choose and use different research methodology. The activities in the formal sector are recorded, registered, and production is reported in government statistics. From a labour-market perspective, the formal economy is characterised by employment guided by the labour law framework, usually devised, implemented and monitored by the state, where issues such as the working hours, minimum wages, health and safety at work, where the social security obligations of employers and employees are prioritised. Jobs in the formal economy are decent decent, meaning offering a fair income, security in the workplace and social protection with workers' contributions to the public services, compared to those in the informal economy (ILO, 2022; Pouri & Hilty, 2018). The informal economy is characterised by a lack of resources and databases from which to choose research methodology. The limitation in methodology choices makes the economy less inspiring by restricting researchers. The evidence is available in literature that there is a research gap between formal and informal economy (UNDP/South Africa, 2020), with more research being conducted in the already developed formal economy. Research in the formal economy is diverse, offering opportunity to use of either nonprobability or probability sampling. It is odd and a concern because approximately 61 percent or about 2 billion global labour force work in the informal sector (ILO, 2022; Sassen et al., 2018). It may translate that most of the available knowledge through research focuses on approximately 39 percent of the global labour force in the formal economy. It suggests that something must be urgently done.

It is also recommended that if researchers want to broaden knowledge development, micro-level individual must be included in studies (Fritsch, Sorgner & Wyrwich, 2019). Most workers in the informal economy are micro self-employed or own-account workers (SEDA, 2022). The inclusion of these micro individual workers is important

and it is stifled by the research methodology choices available. Most research in the informal sector involves or is restricted to nonprobability (face-to-face surveys or interviews) research methodology. For example, a study about the informal trading in the City of Tshwane, looking at the regulatory, spatial and economic framework, indicated that due to lack of database or records of informal businesses, a study was conducted through a survey census (Ligthelm & Van Wyk, 2004), a face-to-face research or nonprobability sampling method. In another study across South Africa focusing on informal retail grocery shops, a concern about the extent to which such businesses were unknown due to lack of records or database of businesses in the informal economy was raised, making it difficult to develop a sample frame that would guarantee statistical representative data (Petersen et al., 2019). Research in the informal economy is restricted to what is available, despite such research being valid, research methods are limited to nonprobability research methods. The concern is that generally, activities in the informal economy are not recorded or registered, and not accounted for in government statistics, restricting researchers to the use of nonprobability sampling research strategies.

2. Conceptual background

2.1 Formal economy and informal economy

The formal economy has associated benefits and costs. A firm in the formal economy pays taxes on salaries while enjoying a high productivity and growth. There is a productivity gap between firms or individuals in the formal and informal economy which is associated to a wide difference in the total factors of production (Fernández & Meza, 2015). Most shocks affecting the formal economy are usually passed on to informal economy, with street traders heavily affected, for example, the most affected during Corona virus (Covid-19) lock downs were workers in the informal economy (ILO, 2022; UNDP/South Africa, 2020). One of the commonalities between formal and informal economies is informal employment which is available in both formal economies. Informal economy is available in developed and developing economies (Bonnet, Vanek and Chen, 2019). Street traders are the most visible workers in the formal economy who are not registered or protected by the social provisions of the organisation.

Informal employment is identified as a precarious job, irrespective of whether or not the organisation for which the person works is formal or informal (Charmes, 2012; StatsSA, 2022). Persons working in informal employment comprise all persons either in the informal or formal economy who are not entitled to benefits such as pension or medical aid contributions from their employer and may have a written employment contract that states that (Charmes, 2012). Street traders do not have income tax deducted from their wages, and employers, own-account workers and unpaid persons helping in street trading business are not registered for either tax or value-added tax (VAT) (Charmes, 2012; StatsSA, 2022). There are two heterogeneous groups of workers in the informal economy, including a relatively secured group of professionals who work independently, earn well to provide for themselves some social securities, and can afford to make provision for their health care and for the management of risk in the work environment (Lund, Alfors & Santana, 2016). The second group are workers who earn little, are more likely to work in unhealthy, unsafe hazardous environments, or with limited access to knowledge and prevention of work-related health hazards (Lund, Alfors & Santana, 2016). The focus of the study is on assessing the work engagement of street traders, the most visible self-employed/own-account micro-level workers in the informal economy using the UWES, the most used instrument in assessing work engagement.

The informal economy is positively associated with economic development by providing most jobs. The people working in the informal economy are more than those working in the formal economy. There are approximately 2 billion people working in the informal economy globally. It translates to more than 61 percent of the global labour force working in about 90 percent of small- and medium-scale enterprises (SMMEs) (Etim & Daramola, 2020; ILO, 2022). Despite the hazardous work environment associated with work in the informal economy, the informal economy provides jobs to those who are unable to find jobs and those who choose to be entrepreneurs in the formal economy. In the informal economy, street traders trade in legal products and/or services, and do not register their businesses with government authorities (Autio & Fu, 2015). Street trading is elusive, where economic activities are either legal and/or illegal. The lack of registration of the street trading entities make it difficult for authorities to provide some regulations (Tshishonga, 2015). Street trading is also considered harmful for workers' rights, including on the fundamental principles and rights at work, social protection, decent working conditions and rule of law (ILO, 2022). It impacts negatively on the development of sustainable enterprises (lack of access to finance and low productivity), public revenues and governments' scope of action, economic, social and environmental policies, robustness of institutions, and unfair competition in national and international

markets (Autio & Fu, 2015). Despite the creation of jobs and economic development, street traders appear to enjoy fewer privileges compared to workers in the formal economy.

The informal economy is defined as informal self-owned enterprises which may either employ relatives or other workers on an occasional basis in various industries (Tshishonga, 2015). Street trading is high during economic downturn, with South Africa recovering from Corona virus, power outages, experiencing the effects of high inflation due to Russia-Ukraine conflicts, and facing a national unemployment rate of approximately 32 percent, which is among the highest in the world (StatsSA, 2022), street trading is on the increase. The informal economy is estimated to contribute approximately 28 percent of the South African economy, with an employment of more than 2.1 million workers, of which 1.2 million workers are male (Sassen, Galvaan & Duncan, 2018). It is reported in literature that informal economic activities contribute approximately 22 percent of the gross value added (GVA), a Gross Domestic Production (GDP) before taxes or subsidies, with an estimated 2.25 million SMMEs, out of which 1.5 million operated in the informal economy (Nsamba & Nsamba, 2021). The contribution fluctuates overtime due to different economics factors in play. Street trading is the most visible form of occupation in the informal economy, which is self-employment or own-account micro-level occupation (Bhowmik, 2005; Chen, 2016; Flock et al., 2015; Ohnsorge & Yu, 2021). The own-account/self-employed workers in the informal economy have received attention from both academics and policy makers (Autio & Fu, 2015; Bhowmik, 2005; Ohnsorge & Yu, 2021). Street traders are described as workers offering goods for sale to the public where from no permanent built-up structure at the place of sale. Street traders are either stationery, where they occupy a space on the pavement or other public and private spaces, or they may be mobile, moving from place to place carrying their wares or trades (Bhowmik, 2005). Working as street traders takes diverse forms (Bonnet, Vanek and Chen, 2019) from no permanent built structure.

The street trading activities are also referred to as backward, traditional, characterised by lower productivity, low technology, low incomes, low capital use and low levels of investment (Ligthelm, 2006; Sassen et al., 2018). These attributes are raising concerns in other spheres of governance, such as being the breeding ground for money laundering and financing of terrorist activities. For example, money launderers and mafia proliferation operate globally, acting as intermediaries between states, capitals and firms in the informal economy (Chen & Carré, 2020). Some of the illicit financial activities are associated with and emanate from conventional and legitimate structures, including churches, traditional herbalists and informal micro-businesses such as spazashops, backyard motor mechanical workshops, hair salons and street traders (Nsamba & Nsamba, 2021). More issues of corruption are rampant in the formal economy, it cannot be ruled out that there is also a lot that is hidden in the informal economy, with no accounting systems. For example, it is reported that in South Africa approximately 10 percent of its annually GDP, an estimated R178 billion every year go to illicit economy, with the smuggling of cigarretes, merchandise, counterfeit textiles and illicit mining of gold and diamonds being the most prevalent (Erero, 2020), which also involves individuals in financial institutions. Some of these products end-up with street traders in the informal economy, especially cigarettes. Street trading businesses are run by anyone in South Africa, including nationals and foreign nationals, men and women, youth and old (Nsamba & Nsamba, 2021). Illegal abortions, which claims a lot of lives or damages on the prospects of reproduction, happen in the informal economy (Chemlal & Russo, 2019). The cigarette industry contributes around R29 billion to the South African economy by providing approximately 108 500 jobs, and R17.2 billion is used to exercise duty and value-added tax (VAT). Some of these illicit cigarettes and counterfeits goods are already available to street traders, calling for strong policy interventions. The impact of money laundering is complex when formal institutions are involved compared to involvement of informal economy.

Thus, the recommendation by the ILO is that attention should also be directed to the informal economy, with policies to promote and encourage entrepreneurship, flow of credit and small businesses, encouraging sustainability and transitioning from an informal economy to a formal economy (ILO, 2018a). The intervention may alleviate and reduce some lawlessness in the informal economy, such as the illegal abortions, dealing in drugs and selling of restricted goods, also to under-aged individuals (Blanton, Early and Peksen, 2018). The lack of monitoring of the informal economy by law enforcement agencies is because these businesses are not deemed impactful as the conventional illicit flows of resources from big businesses (Nsamba & Nsamba, 2021). It is recommended that firms in the formal economy can assist firms in the informal economy through various initiatives, which can be incentivised through tax reductions and the broader collective access to market (Nackerdien & Yu, 2018). The room for co-existence and collaboration between informal and formal economy is inevitable if true economic development and growth are to be fully realised.

Work engagement is defined as a motivational and fulfilling state associated by high levels of physical, psychological and social energy. Engaged works feel better able and willing to commit high effort in their work

activities, resulting in increased performance. Quantitative engagement is popular and most assessed through the UWES (Bakker, 2022; Schaufeli *et al.*, 2019). The UWES assesses work engagement at an individual level. The physical state is assessed through vigour, which is the high level of energy and mental resilience while working and the willingness to invest effort and persist in the face of difficulties. The psychological energy is assessed through dedication, which is the feeling of sense of significance, enthusiasm, inspiration, pride and willing to take challenges. The social energy is assessed using the absorption, which is being fully concentrated and deeply engrossed in the work (Schaufeli *et al.*, 2019). Some environmental conditions are considered for maximum efficiency of the study when conducting studies, whether in the formal or informal economy. These include minimising the risks of being robbed of any electronic gadgets, such as tablets or laptops, should they have been used in data collection process. In the period 2018/2019, crime related to street robbery had reached the highest peak, with street robbery or simple robbery involving a contact between the perpetrator(s) and victim(s) away from home, excluding home robbery or car or truck hijacking, being the highest. The urban or metropolitan areas accounted for the highest number of robberies (StatsSA, 2022b). The unreliable electricity supply in South Africa (Chen, 2016), which affects network coverage, should internet or telephone interviews were used as an option for the study, could have been a challenge. In a study about determining the well-being of informal workers, Rojas (2013) due to some environmental factors such as the prevailing climate of violence and insecurity, a special approach was used in the administering of the survey and the results were valid. Precaution was taken to minimise risks of incidences of robberies during data collection and power outages, and the study will produce valid outcomes.

3. Research methods: sampling strategies

The sampling strategy is one of the core elements that defines a research method and the nature of the study. There are generally two main types of sampling strategies or designs, namely probability sampling and nonprobability sampling (Cooper & Schindler, 2014; Creswell, 2003; Leedy & Ormrod, 2015; Neuman, 2014; Saunder *et al.*, 2016). Different sampling designs may be less or more appropriate to address different research questions in a study (Leedy & Ormrod, 2015). In probability sampling strategy, the sample is selected from the overall population of the study by random selection. The sample is selected in a manner that each member of the population has an equal chance of being selected. Examples of probability sampling are simple random sampling, stratified random sampling, proportional stratified sampling, cluster sampling and systematic sampling. The defining feature of propability sampling is that samples are randomly selected (Leedy & Ormrod, 2015). In nonprobability sampling, the researcher has no way of predicting or guaranteeing that each member of the population will be selected in the sample. In nonprobability sampling, elements of the population have little or zero chance of being sampled. Examples of nonprobability sampling are convenience sampling or accidental sampling, quota sampling and purposive sampling (Leedy & Ormrod, 2015). Most of the studies in the informal economy are conducted using nonprobability sampling as shown on table 1, and this is a concern.

Table 1: Research methods employed in various studies in the informal sector

Author	Nonprobability
Anyidoho (2013); Bushe (2019); Charmes (2012); Chen (2016); Etim and Daramola (2020); Fernández and Meza (2015); ILO (2018); Jütting, Xenogiani and Parlevliet (2007); Musara and Nieuwenhuizen, (2020); Mramba, Tulilahti and Apiola (2016); Nkrumah-Abebrese <i>et al.</i> (2017); Ohnsorge and Yu (2021); Petersen <i>et al.</i> (2019); Rogan and Skinner (2017); Rojas (2013); Sassen <i>et al.</i> (2018); Saunders and Loots (2005); Suharto (2002); Tshishonga (2015); UNDP/South Africa (2020).	Snowballing, participant observation, semi-structured interviews and document analysis, survey through convenience sampling, purposive sampling, empirical review of literature; surveys and interviews, panel studies, census and door-to-door sampling, and focus groups.

Source: Researchers' compilation

Despite being valid, it is a concern as knowledge about a phenomenon in a specific field of study should be developed holistically using all available methods, and not being restricted. The most common disadvantage of nonprobability sampling is that the selected sample is not random sample of the overall population. There is a higher opportunity of bias which may distort the findings of the study, the range within which to expect the population parameter cannot be determined (Cooper & Schindler, 2014; Leedy & Ormrod, 2015). However, it is used because it satisfy the sampling objectives. In the formal economy, both probability and nonprobability sampling strategies are used, with probability sampling being the most recommended for generalisation of knowlwdge purposes. In the informal economy, due to some factors such as lack of records, only one type of

sampling is mostly used. The most common way of assessing informal employment is surveys (Jütting, Xenogiani & Parlevliet, 2007). It is also evident in literature (ILO/OECD, 2019). Despite most studies being valid, the knowledge cannot be easily generalised to the entire population from which the sample is made. Generalisation is one of the shortcomings of the nonprobability studies (Leedy & Ormrod, 2015).

4. Conclusion

The research gap between the informal and formal economy, with more research being conducted in the formal economy is a serious concern. It is also odd because many people work in the informal economy. It is also recommended that to broaden knowledge through research, micro-level individuals must be considered. Street traders, work as self-employed/own-account micro-level workers in the informal economy. It is difficult to include these individuals in research the same way as it is done in the formal economy because their businesses activities are not recorded. It suggests that only 40 percent of the global labour force is fully active to holistically participate in research compared to the 60 percent whose businesses are not registered. The lack of records or database has some restrictions on broader research, this is a concern. The research gap between formal and informal economy is informed by these differences. The strong policy must give attention to where the majority of the labour force is, in this case, the informal economy. The lack of records and accounting systems of firms' activities or individual businesses in the informal economy perpetuate the knowledge gap between the formal and informal economy, leaving the majority of the labour force with few options to benefit from research knowledge development. Nonprobability studies may not be over-generalised compared to probability studies, although such studies are valid and useful.

5. Recommendations

An industry properly grows when knowledge is holistically developed. The formal economy develops knowledge holistically through diverse research strategies. In the formal economy, researchers are able to use both probability sampling and nonprobability sampling research strategies with no restriction, allowing researchers to holistically new develop knowledge. The use of both probability and nonprobability sampling in research makes it possible for the formal economy to be fully developed compared to informal economy which is restricted to nonprobability. In the informal economy, street traders' businesses and activities are not registered, lack records and accounting systems, and are not reported in government statistics. Researchers are restricted to over-rely on nonprobability sampling when conducting studies. The recommendation by the ILO is that policy support must be urgently implemented for businesses in the informal economy. The need to have informal businesses registered and activities recorded or accounted for is long overdue. The registration and accountability will provide a database of informal businesses, making it possible for research to be conducted. A good example is the role played by Pick n Pay in partnership with government, by partnering with small businesses, where the eligibility for partnership is being a registered entity with authority. The partnership allows both parties to benefit by expanding on the customer base and tax exemptions. Some of the criminal activities committed in the informal economy could be reduced if such businesses are registered. Illegal activities in the informal economy could be reduced, leading to a thriving economy.

References

- Anyidoho, N. (2013) Informal economy monitoring study: Street vendors in Accra, Ghana, *Women in Informal Employment*.
Autio, E. and Fu, F. (2015) 'Economic and political institutions and entry into formal and informal entrepreneurship', *Asia Pacific Journal of Management*, 32(1), pp. 67–94. doi: 10.1007/s10490-014-9381-0.
Bakker, A. B. (2022) 'The social psychology of work engagement: state of the field', *Career Development International*, 27(1), pp. 36–53. doi: 10.1108/CDI-08-2021-0213/FULL/HTML.
Bhowmik, S. (2005) 'Street vendors in Asia: A review', *Economic and political weekly*, 40(22/23), pp. 2256–22264.
Blanton, R., Early, B. and Peksen, D. (2018) 'Out of the shadows or into the dark? Economic openness, IMF programs, and the growth of shadow economies', *Review of International Organizations*, 13(2), pp. 309–333. doi: 10.1007/S11558-018-9298-3.
Bonnet, F., Vanek, J. and Chen, M. (2019) *Women and Men in the Informal Economy – A Statistical Brief*.
Bushe, B. (2019) 'The causes and impact of business failure among small to micro and medium enterprises in South Africa', *Africa's Public Service Delivery and Performance Review*, 7(1), pp. 1–26. doi: 10.4102/APSDPR.V7I1.210.
Charmes, J. (2012) 'The Informal Economy Worldwide: Trends and Characteristics', *The Journal of Applied Economic Research*, 6(2), pp. 103–132.
Chemlal, S. and Russo, G. (2019) 'Why do they take the risk? A systematic review of the qualitative literature on informal sector abortions in settings where abortion is legal', *BMC Women's Health*, 19(1). doi: 10.1186/S12905-019-0751-0.

- Chen, M. (2016) 'Technology, informal workers and cities: insights from Ahmedabad (India), Durban (South Africa) and Lima (Peru)', *Environment and Urbanization*, 28(2), pp. 405–422. doi: 10.1177/0956247816655986.
- Chen, M. and Carré, F. (2020) *The informal economy revisited: Examining the past, envisioning the future*, The Informal Economy Revisited: Examining the Past, Envisioning the Future. Taylor and Francis. doi: 10.4324/9780429200724.
- Cooper, D. and Schindler, P. (2014) *Business Research Methods*. 12th edn, Business Research Methods. 12th edn. Edited by Christina Kouvelis and Jane Ducham. New York, United States of America: The McGraw-Hill Companies, Inc.
- Creswell, J. W. (2003) *Research Design: Qualitative, Quantitative and Mixed Methods Approaches*. 3rd edn. London & New York: SAGE Publisher.
- Erero, J. (2020) 'The effects of illicit cigarette trade in South Africa: A CGE analysis', *Journal of Economics and Management*, 40(2), pp. 6–34. doi: 10.22367/jem.2020.40.01.
- Etim, E. and Daramola, O. (2020) 'The informal sector and economic growth of South Africa and Nigeria: A comparative systematic review', *Journal of Open Innovation: Technology, Market, and Complexity*, 6(34), pp. 2–26. doi: 10.3390/joitmc6040134.
- Fernández, A. and Meza, F. (2015) 'Informal employment and business cycles in emerging economies: The case of Mexico', *Review of Economic Dynamics*, 18(2), pp. 381–405.
- Flock, R. and Breitung, W. (2015) 'Migrant street vendors in urban China and the social production of public space', *Population, space and place*, 22(2), pp. 158–169. doi: 10.1002/psp.1892.
- Fritsch, M., Sorgner, A. and Wyrwich, M. (2019) 'Self-employment and well-being across institutional contexts', *Journal of Business Venturing*, 34(6), p. 105946. doi: 10.1016/J.JBUSVENT.2019.105946.
- ILO/OECD (2019) *Tackling Vulnerability in the Informal Economy*. Paris, France.
- ILO (2018a) *Decent Work and The Agenda for Sustainable Development*. Geneva, Switzerland.
- ILO (2018b) *Women and men in the informal economy: A Statistical Picture*. 3rd edn. Geneva, Switzerland.: International Labour Office (ILO) Cataloguing in Publication Data.
- ILO (2022) *World Employment and Social Outlook: Trends 2022*. Geneva, Switzerland.
- Jütting, J., Xenogiani, T. and Parlevliet, J. (2007) *Work and Well-Being: Informal employment revisited*, OECD Development Centre.
- Leedy, P. and Ormrod, J. (2015) *Practical Research: Planning and Design*. 11th edn. New Jersey: Prentice Hall Publishers.
- Ligthelm, A. (2006) 'Size estimate of the informal sector in South Africa', *Southern African Business Review*, 10(2), pp. 32–52. doi: 10.10520/EJC92832.
- Ligthelm, A. and van Wyk, A. (2004) *Informal trading in Tshwane: Regulatory, spatial and economic framework*. BUREAU OF MARKET RESEARCH University of South Africa.
- Lund, F., Alfors, L. and Santana, V. (2016) 'Towards an inclusive occupational health and safety for informal workers', *A Journal of Environmental and Occupational Health Policy*, 26(2), pp. 190–207. doi: 10.1177/1048291116652177.
- Mramba, N., Tuילהti, J. and Apiola, M. (2016) 'Bookkeeping for informal workers: Co-creating with street traders', Springer International Publishing Switzerland. Springer Verlag. doi: 10.1007/978-3-319-39294-3_7.
- Musara, M. and Nieuwenhuizen, C. (2020) 'Informal sector entrepreneurship, individual entrepreneurial orientation and the emergence of entrepreneurial leadership', *Africa Journal of Management*, 6(3), pp. 194–213. doi: 10.1080/23322373.2020.1777817.
- Nackerdien, F. and Yu, D. (2018) 'A panel data analysis of the formal-informal sector labour market linkages in South Africa', *Development Southern Africa*, 36(3), pp. 329–350. doi: 10.1080/0376835X.2018.1487830.
- Neuman, W. (2014) *Social Research Methods_ Qualitative and Quantitative Approaches*. 7th edn. Edinburgh Gate: Pearson Education Limited.
- Nkrumah-Abebrese, B., Danubius, C. S.-A. U. and 2017, U. (2017) 'Street trading in South Africa: a case of the Tshwane central business district', *Acta Universitatis Danubius. (Economica)*, 13(3), pp. 129–139.
- Nsamba, A. and Nsamba, G. P. N. (2021) 'Under-the-radar illicit outflows from South Africa', in *Illicit Financial Flows from South Africa*. Routledge, pp. 76–86. doi: 10.4324/9781003197232-7/RADAR-ILLCIT-OUTFLOWS-SOUTH-AFRICA-ASTERIA-NSAMBA-GEORGE-NSAMBA.
- Ohnsorge, F. and Yu, S. (2021) *The Long Shadow of Informality*, The Long Shadow of Informality. World Bank. doi: 10.1596/35782.
- Petersen, L. et al. (2019) 'What Price Cheap Goods? Survivalists, informalists and competition in the township retail grocery trade'. Available at: <https://www.africaportal.org/publications/what-price-cheap-goods-survivalists-informalists-and-competition-township-retail-grocery-trade/> (Accessed: 24 August 2021).
- Potts, D. (2008) 'The urban informal sector in sub-Saharan Africa: From bad to good (and back again?)', *Development Southern Africa*, 25(2), pp. 151–167. doi: 10.1080/03768350802090527.
- Pouri, M. and Hilty, L. (2018) 'Conceptualizing the digital sharing economy in the context of sustainability', *Sustainability*, 10(12), p. 4453. doi: 10.3390/su10124453.
- Rogan, M. and Skinner, C. (2017) *The nature of the South African informal sector as reflected in the quarterly labour-force survey, 2008-2014*, REDI3(3 Working paper 28).
- Rojas, M. (2013) 'The subjective well-being of people in informal employment: empirical evidence from Mexico', *Evidence-based HRM: a Global Forum for Empirical Scholarship*, 1(2), pp. 169–186. doi: 10.1108/EBHRM-04-2013-0006/FULL/HTML.
- Sassen, S., Galvaan, R. and Duncan, M. (2018) 'Women's experiences of informal street trading and well-being in Cape Town, South Africa', *South African Journal of Occupational Therapy*, 48(1), pp. 28–33.

- Saunders, M., Lewis, P. and Thornhill, A. (2016) *Research methods for business students*. New Delhi: New Delhi: Pearson Education.
- Saunders, S. and Loots, E. (2005) 'Measuring the informal economy in South Africa: economics', *South African Journal of Economic and Management Sciences*, 8(1), pp. 92–101.
- Schaufeli, W. et al. (2019) 'An ultra-short measure for work engagement: the UWES-3 validation across five countries.', *European Journal of Psychological Assessment*, 35(4), p.577., 35(4), pp. 536–577.
- SEDA (2022) *SMME Quarterly Update: 3rd Quarter 2021*. Pretoria, South Africa.
- StatsSA (2022a) *Quarterly Labour Force Survey_Q2_2022_ Embargoed until: 23 August 2022 11:30*.
- StatsSA (2022b) *Statistical release P0341 Victims of Crime: Governance, Public Safety, and Justice Survey GPSJS 2020/21*. Tshwane/Pretoria.
- Suharto, E. (2002) 'Human development and the urban informal sector in Bandung, Indonesia: The poverty issue', *New Zealand Journal of Asian Studies*, 4, pp. 115–133.
- Tshishonga, N. (2015) 'The impact of xenophobia-Afrophobia on the informal economy in Durban CBD, South Africa', *Td The Journal for Transdisciplinary Research in Southern Africa*, 11(4), pp. 163–179. doi: 10.10520/EJC185069.
- UNDP/South Africa (2020) *Impact of COVID-19 ON Micro and Informal Businesses: South Africa 2021*. Pretoria, South Africa.

Masters Research Paper

Using Actor-Network-Theory as a Means of Exploring the Management of Community Development Networks.

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Abstract: This paper explores the use of Actor-Network-Theory (ANT) as a means of understanding the management of community development networks. This was undertaken through the application of ANT as a theoretical methodology to the case of 'Organisation A', a community development organisation operating in Ireland which has grown rapidly over the past 10 years and is embarking on a strategic review intended to examine all aspects of the organisation. The data collection methodology is qualitative and involved senior managers participating in semi-structured interviews. An analysis framework based on ANT was developed with the aim of understanding and articulating the management of this organisation as a complex network. The application of ANT is used to map the state of affairs of a network through the use of conceptual tools. Central to this is identifying key patterns of action as translations. These patterns are then used to explore how translations are negotiated through to completion. In the case of Organisation A, this highlights the management of operations in a network of varied stakeholders. A key output of this study was in identifying the centres of controversy, as areas where translations fail, and need to be further explored. Identifying these areas creates a map which can be used by stakeholders to further assess and develop the empirical state of the network.

Keywords: ANT, community development, community development networks, community development practice, community stakeholders, complex organisations.

1. Introduction

This paper discusses the use of Actor-Network-Theory (ANT) as a means of exploring the management of community development networks. As a theoretical methodology, ANT recognises the world as a collection of relative networks (Latour 2005). These networks are understood to be collections of actors who are connected together through their relations and associations with each other (Latour 2005; Law 1992). Through the application of ANT, the frames of reference of the actors involved can be used to explore and understand the functioning of a network. To investigate this, this paper discusses the exploration of Organisation A as an actor-network and assesses the application of ANT to the case. The case of Organisation A, a community development organisation operating in Ireland, is placed central to this study. The data collected and analysed from Organisation A was initially used for the purposes of a comprehensive master's thesis. The case of Organisation A is selected due to the complex nature of community development networks. The purpose of these networks can seem contradictory when defined as community-led, and yet are often confined by the regulations of institutions and authorities providing necessary funding. Applying an ANT framework to such a network creates an opportunity to unpack complexities and understand how the network functions.

2. Actor-Network-Theory as a theoretical methodology

ANT understands the world to be a collection of relative networks (Latour 2005). The term network is not to be taken in the traditional sense of networks (Latour 1996), but rather as series of interconnected heterogeneous actors. The resulting network is fluid and dependent on the continual reproduction of actions and relations to maintain a particular outcome. In this way, networks are temporary connections between actors working towards an overall aim or function (Law 2009; Law 1992). The theory was first developed as a means determining how the production of scientific knowledge can be attributed as being 'objective' (Michael 2016; Latour 1987). By focusing on the movement of work within a laboratory, patterns of action rendered visible the network which produced objective accreditation as an effect of the work undertaken (Latour 1987). This is visible through the traces left behind, such as an actor remembering a conversation, or having a physical product as the result of an interaction. By adopting ANT as a theoretical methodology, it is possible to use such traces to understand the functioning of a network.

To successfully apply ANT, certain tenets need to be adhered to. The first of these states that networks should be approached with no prior assumptions. As a product of the interactions between actors, it is the actors who must shape the network by disclosing information from their frames of reference. To adopt Latour's (2005)

analogy, exploring an actor-network begins as an artist would begin painting, by beginning at the centre of the network and working outwards, rather than choosing the frame first and then working inwards. This is significant in the field of community development where increasing complexity has resulted in an ambiguity in delineating the boundary of the field (Daly 2007; Lee 2003).

Secondly, a 'flat ontology' must be adopted. This recognises relations between actors as being organised in flat *lengths* of associations (Latour 2005; Law 1992), rather than around different levels or depths. Importantly, this perspective rejects the analytical distinction between the macro- and the micro-social (Latour 1996; Law 1992). In the community development field, this distinction is strongly prevalent as the dichotomy between 'top-down' institutions and 'bottom-up', or grassroots, community groups (McDonagh 2017; Daly 2007). For example, Organisation A is a community-led organisation but is restricted by the regulations of institutions which provide them with necessary funding and supports. It would therefore prove difficult to determine a suitable 'level' to analyse the organisation from. As a series of flat lengths of associations, an "empirical grasp" (Latour 2005: 251) can be reclaimed.

Finally, ANT does not make any distinction between humans and non-humans. Instead, all actors are understood to have no inherent qualities. These are instead produced as a relational effect of the network, and therefore, the distinction between human and non-human actants is of little analytical importance (Law 2009: 147). This creates the opportunity to objectively trace together the intricate patterns of action which enable a network to "simultaneously embrace a multitude of objects" (Strum and Latour 1987: 790). When applying ANT to a study, an actor is "any entity that more or less successfully defines and builds a world filled by other entities with histories, identities, and interrelationships of their own" (Callon 1990: 140). In this way, an actor can be both a collective or an individual. In the case of Organisation A, the organisation itself is recognised and functions as an actor, and yet it is also made up of a collective of human and non-human actors.

3. Applying Actor-Network-Theory

The distinction of ANT as a theoretical methodology is significant. Rather than a social theory, it is a "disparate family of material semiotic tools" (Law 2009: 145). As such, ANT is used as a 'conceptual toolkit'. The value of this is in the capacity of ANT to explore the current state of affairs of Organisation A as an actor-network. This emphasises the importance of ANT as a theoretical methodology instead of simply a theoretical lens. In other terms, the actual 'doing', or carrying out, of ANT lies in its application and practice. To describe this further, the application of ANT to Organisation A happened in two phases: the deconstruction of Organisation A, and the reassembly of the actor-network.

During the first phase, semi-structured interviews were conducted with senior managers and directors from Organisation A. This sample was selected due to their positions as mediators within the organisation. The initial interviews allowed for participants to describe the network from their own frame of reference prior to scientific explanations (Kvale 1996). Follow-up discussions introduced the participants to ANT in order to integrate a reflexive lens on the operations and functioning of Organisation A. The content from these interviews was then written up as descriptions. Within ANT, descriptions are observations made regarding the relations between actors in a network (Latour 2005). Similar to Latour's belief that network exploration should 'follow the actors' (2005), Geertz (1973) has previously questioned how, without such descriptions, someone can speak on the behalf of the subjects of their study, especially if they cannot speak to them directly. Therefore, the descriptions present a collective frame of reference, rather than an 'abstract identity' (Geertz 1973: 24) of the organisation.

The second phase was to create an actor-network 'map'. This focuses on the everyday actions, activities and behaviours of actors (Nimmo 2011: 113). After identifying the primary actors, the next step is to identify the main patterns of action, conceptualised as a translation. A translation is what makes an actor-network fluid by mobilising actions through a network (Callon 1986; Michael 2016). A successful translation passes through four moments: problematisation, interessement, enrolment and mobilisation (Callon 1986):

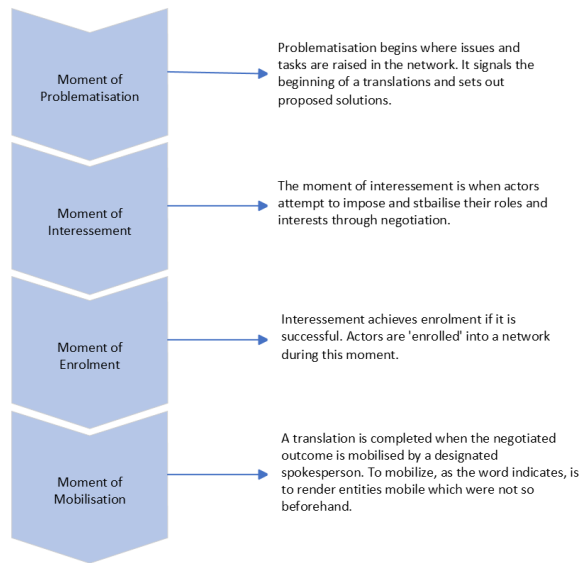


Figure 1: Callon’s Four Moments of Translation (1986).

It is also of interest to take into account what happens when a translation fails. Where different frames of reality “rub up against one another” (Law 2009: 144) a centre of controversy, as an area of shared uncertainty (Venturini 2010; Latour 2005; Dolwick 2009), is created. These areas can cause disruption by altering the state of beliefs and “the identity and characteristics of the implicated actors” (Callon 1986: 73). Identifying any centres of controversy and examining what devices and techniques were used in their construction can therefore further help to understand the functioning of the network.

3.1 Organisation A as an actor-network

The translations below are derived from the dominant patterns evident in Organisation A’s actor-network. These patterns depict a representative outline of the successful actions carried out. The reproduction of these patterns of action contributes towards Organisation A’s overall goal of developing communities. In order to detail this more clearly, the translations have been laid out according to each moment of translation.

Table 1: Actions which begin the moments of problematisation.

Translation A	Translation B	Translation C	Translation D
Issues and tasks are raised by directors of the board	Community groups approach Organisation A 1) For financial support 2) For support during crises events	Programme referrals are assigned from government institutions	Individuals come to Organisation A for support

Problematization begins where issues and tasks are raised within the network. Importantly, this is only done with a preconceived solution in mind. This solution involves establishing relations with other actors to realise a potential resolution by creating a “system of alliances” (Callon 1986: 61). As is evident in table 1, each of the translations begins with an external entity raising a task or issue with Organisation A as the provider of a potential solution. Identifying moments of problematisation in a translation reveal what type of issues and tasks are most commonly being undertaken by the network and who they are being raised by.

Table 2: Interessement devices as described in the collected data.

Translation A	Translation B	Translation C	Translation D
<ul style="list-style-type: none"> • Meetings • Phone calls • Information documents • Presentations 	<ul style="list-style-type: none"> • Funding guidelines • Meetings • Community events • Phone calls 	<ul style="list-style-type: none"> • Programme guidelines and regulations • Computer recording systems • Phone calls • Emails 	<ul style="list-style-type: none"> • Relations with stakeholders • Meetings • Community events • Computer recording systems

Translation A	Translation B	Translation C	Translation D
	<ul style="list-style-type: none"> Information documents Community relations Staff experiences 	<ul style="list-style-type: none"> Relations with stakeholders Evaluation reports 	

The moment of interessement, when the identity and roles of actors are realised within an alliance, is supported by the use of interessement devices. These devices are anything which is used to negotiate particular interests and roles during this moment. They do so through the displacement of opposing, or competitive interests (Callon 1986). In the Organisation A actor-network, there was evidence of a varied range of devices being used (Table 2). More specifically, these devices were used to negotiate translations by informing frameworks and by creating relational spaces between actors.

Frameworks are used to give the impression of a clear and precise boundary (Callon 1989). Actors within Organisation A implement particular frameworks to aid the enrolment of other actors by appealing to a particular frame of reference. So much so, that the translations reveal particular frameworks which are consistently used by actors within the network. Notably, the community development practitioner frames professional knowledge in a manner that can be negotiated into the existing community knowledge base as ‘common sense’ (Gilchrist 2019). They must relate information so that it can be sustained by the social reality of any actors involved (Eversole 2010; Fussell 1996). Acknowledging that these multiple and varied frameworks are simultaneously and consistently being enacted sheds light on the seeming complexities of the network. From this, the “informal, fragmented [and] ad hoc” (Neville 2016: 731) practice of community development can instead be appreciated as the use of sophisticated and layered frameworks by actors.

Closely aligned to this is the use of relational spaces. Here relational spaces are understood as events which are “practically mediated through media and communication technologies, as language-based systems of symbols and material practices” (Ek 2006: 54). Organisation A described three relational spaces frequently used; in-person events such as meetings and consultations, digital and virtual spaces and office spaces. When negotiating roles and interests during a translation, the use of relational spaces provides an opportunity to delimit the scope and context of a particular translation. The effective use of relational spaces can enhance the negotiation process through the provision of a space through which all necessary information can be gathered and mediated. Relational spaces offer the potential to assess the “situated knowledge of a physical ecosystem” (Eversole 2010: 5), which in this case is the working environment of Organisation A. Given the fixed geographic ties of Organisation A, this assessment allows for “constant revisions to our understanding of the immediate and changing world in which we live” (Gilchrist 2019: 61). Particularly when taking into account the overlapping crises recently faced by communities, there is a recognition that “community have become the watchworld of crises” (Meade 2020).

Table 3: Moments of Enrolment and Mobilisation

	Translation A	Translation B	Translation C	Translation D
Moments of Enrolment	A solution for the task or issue raised has been agreed upon	<ol style="list-style-type: none"> Access to funding has been successful Communities are provided with necessary support 	Participants successfully take up places on programmes	Individuals receive support from Organisation A
Moments of Mobilisation	Organisation A facilitate the resolution and become the spokesperson for all associated with the resolution.	Organisation A take on the role of spokesperson in advocating for the needs of the community group.	Organisation A fulfil the role of spokesperson for programme participants, as well as the programme producers.	Where a suitable resolution is found Organisation A take on the role as spokesperson for the individual.

Moments of enrolment are reached when the roles and interests of all actors involved have been negotiated and defined (Callon 1986). This moment can only be reached if the previous negotiations were successful. This is seamlessly followed by the moment of mobilisation, evident through the appointment of a spokesperson who enacts the agreed upon solution (Latour 2005). Interestingly, in the Organisation A actor-network each translation ends at the moment of mobilisation with Organisation A adopting the role as spokesperson. This position can be equated to that of a representative within the field of community development, especially where community development practitioners are labelled as catalysts for the development of local communities

(Henderson and Vercseg 2010; Toomey 2008). In the case of Organisation A, their negotiation into this position is purposeful as it is a position from where they can act as a central conduit for their network of stakeholders.

The above translations represent the most common patterns of action within the Organisation A actor-network. However, in the unpredictable and everchanging nature of community development (Meade 2020; Lee 2003) the completion of translations is not always a given. Where the above translations identify the components used to draw together the actor-network, the following controversies reveal what is hindering the successful functioning of the network (Neisser 2014). These controversies reveal the intricate and tightly interwoven nature of organising within a network. This demonstrates how, in place of compartmentalisation, reassembling the actor-network offers a means of depicting and exploring any tensions as they exist in the modern world (Cunha and Clegg 2019; Nimmo 2011).

3.2 Controversy A – The management of multiple representations

The first pattern of uncertainty evident is regarding the management of multiple representations. As a community development organisation, Organisation A takes on multiple, and sometimes contradictory roles and interests in order to represent their wide range of stakeholders. The actors of Organisation A facilitate “boundary-spanning co-operation, co-ordination and communication” (Gilchrist 2019: 55). The interests of Organisation A lie in their ability to build and maintain the conditions necessary for the successful completion of a translation. It is through this ability that they can place themselves in the position of spokesperson, and subsequently act as a representative for a hugely diverse range of stakeholders. However, this exposes a functional ambiguity (Shaw 2008).

Uncertainties arise over difficulties regarding the management of these representations, and the fact that they are continuous, overlap and can compete with each other. Conflicts of interest are evident when taking into account that Organisation A also act as a representative for other actors, such as funding bodies, government agencies and other development organisations. The appreciation of ANT also takes into account non-human actors such as office buildings, computers, cars and community halls. This is a prime example of how “modern management occurs in a net of fragmented, multiple contexts, through multitudes of kaleidoscopic movements” (Czarniawska 2008: 6). In a sense, it can be considered how Organisation A are in a position whereby they have to grant their members autonomy but also potentially constrain their freedoms by taking collective actions towards the overall development of local communities (Tortoriello *et al* 2012).

Given these conflicts of interest, actors within Organisation A must be able to align their roles and interests within any translation they are involved in. In this position, actors continually have to reorganise in order to accommodate representations. This enables Organisation A the opportunity to displace any conflicting interests and enrol any variety of stakeholders within a single translation. They do this through employing the use of frameworks to communicate and enact particular ideologies. Organisation A were notably reliant on the use of metaphors, clarifying terms, and images as a way of moving between the known and the unknown (Nisbet 1969). As Turner describes, a collective of symbols and metaphors can have “core meanings linked analogically to the basic human problems of the epoch” (1974: 28). Therefore, these ideologies communicated throughout the network can be said to be reflective of the movement of the network as a complex entity. In the case of Organisation A, the idea of building the capacity of communities was most commonly embedded. Actors of the network used a metaphor, which can be traced back to Chinese philosopher Lao Tzu, which states that if you teach a man to fish you can feed him for a lifetime. Alongside this, Organisation A adopted the clarifying term of a ‘holistic approach’. This emphasised the shared perspective that a community is made up of individuals and that supporting individuals contributes towards supporting the community. As well as this, this framework is used to address any “spasms of adjustment” (Fussell 1996: 47) when aligning interests and roles towards the development of local communities.

3.3 Controversy B – The remit of community development work

The second controversy is regarding the ambiguous remit of community development work. The work and actions undertaken within the field of community development are varied and happen in accordance with events in the wider ecosystem of a network. As Shaw states, “community has always accommodated a range of related but contradictory meanings” (2013: 1), a sentiment which also extends to the practice of community development work. Organisation A actors are also restricted by the “need to undertake changes driven by the evolving demands of their own donors” (Laurett and Ferreira 2018: 881). This is highlighted by the fact that none of the patterns of translation originate within the organisational network and instead are primarily based on

responding to issues and tasks raised by other stakeholders. Therefore, although any subsequent negotiations work towards the general aim of developing local communities, there is little to no restrictions placed on what problems or issues can be raised.

The importance of Organisation A's function in the representation and mobilising of community development actions is highlighted here. For example, when local community groups seek out support, as in Translation B, they are establishing a relationship whereby Organisation A can further mobilise their interests as their representative along longer lengths of associations where they are not directly associated. The value of this ability to represent interests across networks is also perceived to be a necessity. Given the geographically bound nature of community networks, the initial interests of geographically fixed actors can be reduced or lost when moving up lengths of connections and associations. Community ecosystems of related actors are composed of intricate connections and embedded into 'place connections' (Cavaye and Ross 2019: 3). This also involves all aspects of the physical environment which are inherent to the working environment of Organisation A.

Boundary objects, which "straddle different networks (or social worlds)" (Michael 2016: 155), are placed so as to continually assess an actor-network. These actors act as the most direct connections to the working environment as the actors that are 'on the ground'. Relational spaces are commonly facilitated by boundary objects for the purposes of this assessment. For example, events which take place in community halls, or meetings in office buildings. Within the field of community development, this assessment presents itself as "the cultural presuppositions, values and meanings" (Eversole 2010: 5) that are carried through actions within the development process. The information gathered in these relational spaces are crucial to informing frameworks to be "understood and applied in new domains" (Tortoriello *et al* 2012: 1027). Therefore, where boundary objects have a stable presence within a network, it can be characterised as a self-organised web of mutually symbiotic relations (Gilchrist 2019; Daly 2007). In this way, where the individual translations in themselves are not enough to constitute community development, the output of the collective translations is what *becomes* community development. Therefore, the roles and interests of community practitioners are multiple and varied and defining them is a necessary part of each translation in order to embed the work into the wider actor-network.

4. The benefits of applying Actor-Network-Theory

A key advantage of the actor-network map is the ability to understand the interconnected nature of a network rather than undertaking an analysis in isolated segments. By looking at the patterns of action and inaction uncovered, it is clear that there are areas of overlap, from negotiation devices which are enacted in multiple ways, to similar uncertainties which contribute to both centres of controversy. By following the actors' descriptions of their current state of affairs, it depicts the organic way in which networks function. This includes non-human actors that have "the potential to shape civil society" (Daly 2007: 162), and virtual spaces through which relations are increasingly being undertaken (Czarniawska 2008). As a result of this, the findings are directly related to the concerns and understandings of the actors. Their collectively constructed network is deconstructed and reconstructed "as a whole set of meanings and as a lived experience" (McDonagh 2017: 3) which they can recognise through their individual frames of reference (Latour 2005). Therefore, the resulting actor-network map has great potential to be used as a tool to highlight areas of empirical development within the network.

The use of ANT also has significant reflexive properties. The actors who participated in the series of interviews were integral in providing descriptions to build the actor-network. Importantly, the interviews became a process where there was "no distinction between the one who teaches and the one who learns" (Fussell 1996: 52). By introducing the participants to ANT and including them in the research process, the participants were given an opportunity to reflect on their own frames of reference without being restricted to the guidelines of, for example, a computer reporting system. Where the reflexive properties of ANT have been previously recognised within a research process (Sheehan 2011; Michael 2016), there is the potential to investigate the use of ANT as a reflexive tool for professional use within organisational assessment and evaluation processes.

5. Areas for further consideration

The analysis of a translation begins at the moment problematisation. However, there is little to no recognition of the issue or task prior to being raised with a corresponding solution. Therefore, issues and tasks are only taken into consideration where there are evidently active attempts being made within the actor-network. This asks the question of what actions and steps can be made in order to expand this reach to acknowledge the problems

not actively being addressed. In relation to crises events, this would assist in creating opportunities to prepare and plan, rather than only being able to take up action when there is an immediate reaction or solution is needed. Equally, there is an opportunity to further investigate the prioritisation and selection of tasks and issues translated as the displacement of translations against one another.

As well as this, an actor-network depicts the state of the network during the timeframe within which the data and descriptions are collected. Therefore, in order for ANT to be implemented as an effective tool for use by the actor-networks themselves, a method of being able to regularly implement ANT tools and frameworks would be required. However, this has potential impracticalities that need to be considered. In particular, the time required to carry out an application of ANT has resulted in the process being dubbed as a “*slowciology*” (Latour 2005: 122). The distinctiveness of what should be included and not included within a network is also up to the discretion of the analyst (Michael 2016). Therefore, while the process is necessary for the reform of the current knowledgebases in an actor-network, consideration would need to be given as to how ensure the process isn’t manipulated along the way.

6. Conclusion

This paper has demonstrated the use of ANT as a means of exploring the management of community development networks. This was carried out through the application of ANT to the case of Organisation A, a community development organisation in Ireland. ANT focuses on the associations created that establish heterogenous networks through which actions and translations move through (Latour 2005; Michael 2016). Adopting ANT as the theoretical methodology for this research project takes into consideration the continually shifting nature of networks (Latour 1999). The application of ANT requires adhering to the basic principles of ANT and the support of conceptual tools. In the case of Organisation A, the primary concepts used were to identify translations, as the main patterns of action within the network. Following this, two centres of controversy were also identified. Therefore, the findings enabled the most evident patterns of action and inaction in the Organisation A actor-network to be explored. As a result, the application of ANT demonstrated its ability to determine the nature of ambiguous networks. From this, there is potential for ANT frameworks to be further developed for implementation and practical use of ANT in the evaluation and assessment of actor-networks.

References

- Callon, M. (1986). “Some elements in a sociology of translation: domestication of the scallops and the fishermen of St Brieuc Bay” In John Law (ed.), *Power, Action and Belief: A New Sociology of Knowledge?* London, Routledge: 196-233.
- Callon, M. (1990) ‘Techno-economic Networks and Irreversibility’, *The Sociological Review*, 38(1_suppl), 132–161.
- Cunha P.E. and Clegg, S. (2019) *Management, organizations and contemporary social theory*. Routledge.
- Daly, S. (2007) ‘Mapping civil society in the Republic of Ireland’, *Community Development Journal*, 43(2), 157–176.
- Dolwick, J.S. (2009) “‘The Social’ and Beyond: Introducing Actor-Network Theory”, *Journal of Maritime Archaeology*, 4(1), 21-49.
- Ek, R. (2006) “Media studies, geographical imaginations and relational space”, in *Geographies of communication. The spatial turn in media studies: 45-66*.
- Eversole, R. (2010) ‘Remaking participation: challenges for community development practice’, *Community Development Journal*, 47(1), 29–41.
- Fussell, W. (1996) ‘The Value of Local Knowledge and the Importance of Shifting Beliefs in the Process of Social Change’, *Community Development Journal*, 31(1), 44–53.
- Geertz, C. (1973) “Thick Description: Towards an Interpretative Theory of Culture”, in C. Geertz, *The Interpretation of Cultures*. New York: Basic Books.
- Gilchrist, A. (2019) *The Well-Connected Community: A networking approach to community development*, 3rd edn., Bristol: Policy Press.
- Henderson, P., Vercseg, I. (2010) *Community Development and Civil Society: Making Connections in the European Context*, Policy Press.
- Kvale, S. (1996) *InterViews: An Introduction to Qualitative Research Interviewing*, Sage.
- Latour, B. (1987) *We Have Never Been Modern and Science in Action*, Cambridge, MA: Harvard University Press.
- Latour, B. (1996) ‘On actor-network theory: A few clarifications’, *Soziale welt*, 369–381.
- Latour, B. (2005) *Reassembling the Social: An Introduction to Actor-Network-Theory*, Oxford university press.
- Law, J. (1992) ‘Notes on the theory of the actor-network: Ordering, strategy, and heterogeneity’, *Systems practice*, 5(4), 379–393.
- Law, J. (2009) “Actor Network Theory and Material Semiotics”, in B. S. Turner (ed.) *The New Blackwell Companion to Social Theory*, John Wiley & Sons.
- Lee, A. (2003) ‘Community development in Ireland’, *Community Development Journal*, 38(1), 48–58.

- McCrea, N. (2016) "Community development, venture philanthropy and neoliberal governmentality: a case from Ireland", in Meade, R. and Shaw, M., Banks, S. (eds.) *Politics, Power and Community Development*. Policy Press, pp. 103.
- McDonagh, J. (2017) *Renegotiating Rural Development in Ireland*, Routledge.
- Meade, R.R. (2020) "CDJ Editorial—What is this Covid-19 crisis?" *Community Development Journal*, 55(3), pp.379-381.
- Michael, M. (2016) Actor-Network Theory: Trials, Trails and Translations, Sage.
- Neisser, F.M. (2014) "'Riskscapes" and risk management—Review and synthesis of an actor-network theory approach', *Risk Management*, 16(2), 88–120.
- Neville, P. (2016) 'Organised Voluntarism in Ireland', *VOLUNTAS: International Journal of Voluntary and Nonprofit Organizations*, 27(2), 724–745.
- Nimmo, R. (2011) 'Actor-Network Theory and Methodology: Social Research in a More-Than-Human World', *Methodological Innovations Online*, 6(3): 108–119.
- Nisbet, R. A. (1969) *Social Change and History: Aspects of the Western Theory of Development*. London: Oxford University Press.
- Shaw, M. (2008) 'Community development and the politics of community', *Community Development Journal*, 43(1), 24–36.
- Shaw, M. (2013) "Community work today: Competing demands in practice", *Concept*, 4(2):10-10.
- Sheehan, R. (2011) 'Actor-network theory as a reflexive tool: (inter)personal relations and relationships in the research process', *Area*, 43(3), 336–342.
- Strum, S.S. and Latour, B. (1987) "Redefining the social link: from baboons to humans", *Social Science Information*, 26(4), 783-802.
- Toomey, A.H. (2011) 'Empowerment and disempowerment in community development practice: eight roles practitioners play', *Community Development Journal*, 46(2), 181–195.
- Tortoriello, M., Reagans, R. and McEvily, B. (2012) "Bridging the knowledge gap: The influence of strong ties, network cohesion, and network range on the transfer of knowledge between organizational units", *Organization science*, 23(4):1024-1039.
- Turner, V. (1974) *Dramas, Fields, and Metaphors: Symbolic Action in Human Society*, London: Cornell University Press.
- Venturini, T. (2010) "Diving in magma: how to explore controversies with actor-network theory", *Public understanding of science*, 19(3): pp.258-273.

**Work
in
Progress
Paper**

Datafication in Smart Cities: Understanding How the Public Experience Urban Environments

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Abstract: Datafication has become a prominent feature of smart cities, where sensors, monitoring devices, and AI are being integrated with city infrastructures and facilities, resulting in rapidly changing urban areas informed by data-driven decision-making processes. Although there is a vast amount of data being generated about urban environments and citizens, research on understanding citizens' social experience in smart cities has been limited. This study proposes a three-stage research design that provides datafication solutions to understand citizens' experience of urban environment in a synergistic manner. We employ a mixed methods approach drawing upon multiple data collected by the researcher, from the citizens, and across smart cities open data platforms. It is designed to undertake a place-based and citizen-centric approach to understand the lived social experiences of citizens in urban environments. This work will contribute to our current understanding in developing socially sustainable smart cities, providing methodological insights for future research on how datafication process can be leveraged to improve quality of urban life.

Keywords: datafication, open data, online survey, spatial statistical modelling, moderation and mediation analysis, text mining

1. Introduction

The smart city concept has recently become closely associated with quality of life in terms of improving urban liveability (Macke, Casagrande, Sarate, & Silva, 2018), achieving social sustainability (Aurigi & Odendaal, 2021), and fostering a citizen-centric urban development (Andreani, Kalchschmidt, Pinto, & Sayegh, 2019 via knowledge-based solutions. As such, smart cities require publicly accessible datasets (Neves, Neto, & Aparicio, 2020). The datafication of urban life in a smart city consists of a wide range of living experience emerging from city infrastructure, service delivery, and urban amenity. In this regard, it is critical for us to understand how citizens experience and perceive urban environments in the context of social space (Balsa-Barreiro, Menendez, & Morales, 2022), and particularly, urban public spaces. Urban public spaces are the social settings for people to engage in interactions and facilitate 'good urban living' which can effectively (re)vitalise urban areas and are essential for the success of smart cities development (Holland, Clark, Katz, & Peace, 2007). However, despite smart sustainable urbanism becoming increasingly data-driven, there has been very little research effort in datafication pertaining to citizens' experience and the social performance of urban space. Therefore, this paper aims to address the research gap by proposing a mixed research approach that harnesses the strengths of behaviour mapping, open government data, and volunteered geographic information to study user experiences and perceptions in public spaces.

2. Related work

As information technology is embedded in our built environments, the continuous collection of data by deploying digital transformation and technological solutions across sustainable development and management practices aims to make our cities more efficient and liveable. Smart cities, integrating pivotal technologies such as Internet of Things (IoT), cloud computing, big data, and AI, now not only encompass the characteristics of digital city (i.e., datafication of urban practices, technocentric planning solutions, etc.), but are also meant to be conducive to the social and economic transformation required to meet the needs of citizens (Zhao & Zhang, 2020).

While some scholars critique that the first generation of smart city development fell short in exploiting a citizen-centric agenda (Trencher, 2019), many point to a bold ambition to tackle the social challenges brought by the techno-economic and centralised approach of recent smart city interventions (Appio, Lima, & Paroutis, 2019). Some key dimensions related to the social challenges of smart city have been explored in the literature including social inclusion in affordable technology infrastructural services, maintaining social capital in smart neighbourhood management (Nakano & Washizu, 2021), environmental equity (Monfaredzadeh & Krueger, 2015), and social sustainability in engaging with the livelihoods of the marginalised citizens (Aurigi & Odendaal,

2021). Notwithstanding the implications of developing socially progressive and sustainable smart cities, Aurigi & Odendaal (2021) calls for the need of revealing empirical evidence using context-sensitive and place-based approaches that are essential for enhancing the social sustainability of smart cities. Adding to, and complementing these observations, we argue that there is a data-driven and citizen-centric discourse in the smart city paradigm in response to the unique urban built environment forms (spatial context), everyday social interactions (social context) and urban lifestyles. The gaps in exploring datafication to transform domains of urban life and understand social performance of the smart cities urban environment, still prevails at the expense of making smart cities more liveable and socially sustainable.

3. Methodology

This study proposes a three-stage research design that aims to understand citizens’ experience of urban environment in a synergistic manner by employing multiple data sources in response to understanding the datafication process in smart cities. The datafication process designed consists a collection of spatial, statistical, and text data that will be digitised and processed using (open sourced) GIS applications and Python, outlines in Table 1, We then discuss how they offer the complementary views on understanding how the public experience urban environment.

Table 1: Detailed description of the proposed mixed methods.

Data Components	Datafication stage 1: Data Collection	Datafication stage 2: Data Preparation	Datafication stage 3: Data Processing
Social Interactions	Primary spatial data collected by quantifying social interaction via a <i>behaviour mapping</i> exercise.	Digitisation: georeferencing social interaction points using ArcGIS .	Spatial analysis: hotspot analysis (spatial autocorrelation analysis).
Urban Public Spaces	1. Sheffield City Council Open Data – smart cities open data collected by local authorities; 2. Ordnance Survey MasterMap – authoritative open data collected by national mapping agency; 3. OpenStreetMap – crowdsourced data / volunteered geographical information (VGI) collected via online platform.	Spatial Preprocessing in QGIS : 1. geographical feature overlay; 2. interpolation; 3. feature selection analysis.	Spatial statistical modelling: 1. buffer analysis; 2. road network analysis; 3. geographically weighted regression analysis.
Citizen Perceptions	Primary statistical and text data representing citizens’ perspectives on their social experience in urban environments collected via <i>online open-ended survey</i> .	Data preprocessing in Python : 1. feature handling: numeric and categorial value; 2. handling missing value and duplicates; 3. dealing with outliers.	Moderation and mediation analysis Text mining: sentiment analysis with machine learning (ML) based approach using Python NLTK, an open-sourced library for natural language processing (NLP) in Python.

As shown in Table 1, the proposed datafication process consists three stages to quantify and convert various domains of urban social life, physical urban environment, and the perceptions of citizens to reach a data-driven understanding of citizens’ social experience of urban environment.

The primary data collected from a behaviour mapping effort will allow us to capture the temporal and spatial distribution of the observed social interactions in urban public spaces. The social interactions will be mapped based on the different typologies, i.e., passive sociability, fleeting sociability, and enduring sociability (Mehta, 2019), within a variety of public spaces located in both the city centre and residential neighbourhood settings. In addition to digitising the data points, a spatial autocorrelation analysis will be conducted using ArcGIS to uncover the pattern by which citizens’ social life unfolds in contemporary urban spaces.

A collection of open sourced data including smart cities open data (Sheffield City Council Open Data, 2023), Crowd sourced data, and authoritative online data will be batch processed using (open sourced GIS application) QGIS. We will conduct spatial statistical modelling to build an integrated urban model which evaluates the quality of the built environment. Specifically, the integrated model consists of three layers of geoprocessing functionality in terms of measuring the diversity (Shannon’s Evenness Index), density (Ratio of employment density (population/workplace Points of Interests (POI))), and design (connectivity) of urban amenity /

infrastructure within the 800 m radius buffer of the observed public spaces (Kim & Hipp, 2021). The quality of the urban built environment in which the public spaces are situated in will be calculated by adopting a negative binomial regression approach (Kim & Hipp, 2021).

Finally, the online open-ended survey will collect primary data representing the demographics of members of the public and their views on: 1) physical characteristics of public spaces; 2) the kind of social interactions they experience; and 3) how they value their social experience in urban spaces. Using the statistical and text data collected from the online open-ended survey, we can validate the relationship between public spaces and social interaction by conducting moderation and mediation analysis using the sociodemographic and perceptual factors as the moderator and mediator. To further understanding citizens' perceptions of the social experience in urban environment, we will apply text mining and sentiment analysis to reveal their preferences of urban public spaces and values of social interactions using open sourced Python NLP libraries in terms of complementing the research findings.

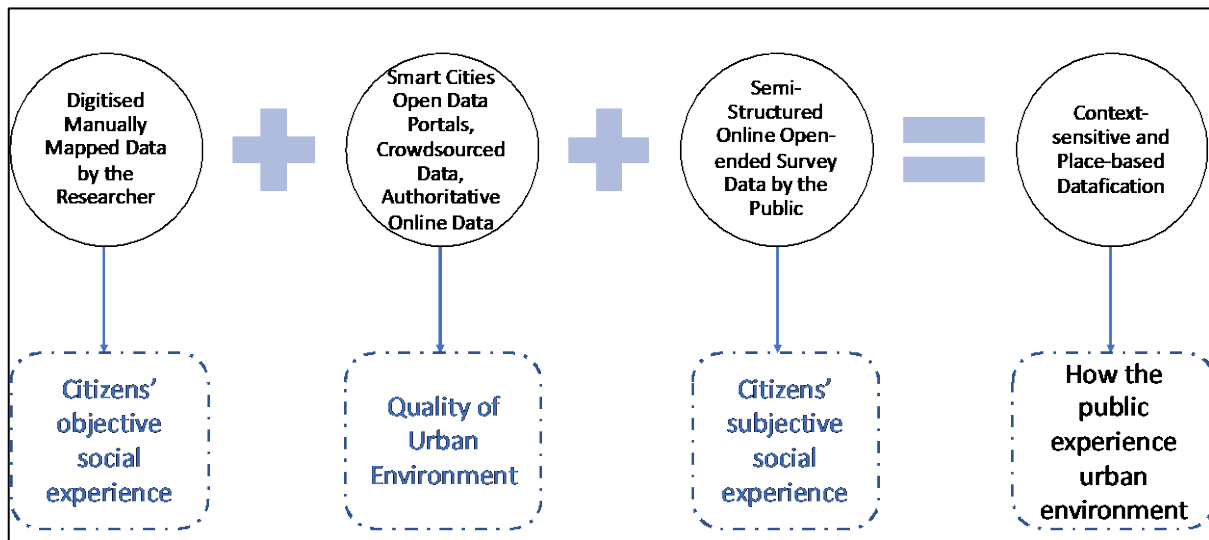


Figure 1: The complementary relationship of different data components.

As shown in Figure 1, the proposed research stages are complementary in terms of understanding how the public experiences urban environments by integrating data sourced from a behaviour mapping effort, online public participation, and across multiple open data platforms facilitated by the smart cities initiative. Such effort allows data-driven analytical thinking in smart sustainable urbanism practices (Bibri, 2019), as well as draws specially attention to the citizen-centric datafication that represents spatial realities of directly experienceable urban environment and contemporary social life (Christmann & Schinagl Leibniz, 2023). Specifically, the behaviour mapping process complies the physical and functional features of urban environments (Subiza-Pérez, Vozmediano, & Juan, 2019) whilst uncovering citizens' social experience within the urban setting using an objective approach. The open data we sourced from smart cities, authoritative, and crowd sourced platforms makes the basis of the raw data to develop urban space model that evaluates the quality of the built environment. In addition, the semi-structured data we collected via online open-ended survey not only enables smart citizen participation but also allows an in-depth understanding of the citizens' perceptions of their social experience in urban environment. The proposed research design, therefore, is closely aligned with the place-based and citizen-centric approach of exploring socially sustainable smart cities suggested by Aurigi & Odendaal (2021), by which we make priority-informed and data driven decisions utilising analytical techniques derived from urban informatics such as geoprocessing, statistical modelling, and text mining.

4. Conclusion

The construction of smart cities deemed to impact on the urban forms and everyday lifestyles with placemaking becomes attentively integrated with pivotal technologies in equipping the datafication process in smart cities. In this study, we propose a datafication solution to understand citizens' lived experience in contemporary urban environments, proving the methodological insights which will help researchers and practitioners to better understand the social dimensions of smart cities development. As part of future work, we will look at understanding citizens' social life further in different city contexts (i.e., metro city, garden city,

megacity, etc) and further exploration in datafication solutions to transform domains of urban life and improve quality of urban environments,

References

- Andreani, S., Kalchschmidt, M., Pinto, R., & Sayegh, A. (2019). Reframing technologically enhanced urban scenarios: A design research model towards human centered smart cities. *Technological Forecasting and Social Change*, 15-25.
- Appio, F. P., Lima, M., & Paroutis, S. (2019). Understanding Smart Cities: Innovation ecosystems, technological advancements, and societal challenges. *Technological Forecasting & Social Change journal*, 1-14.
- Aurigi, A., & Odendaal, N. (2021). From “Smart in the Box” to “Smart in the City”: Rethinking the Socially Sustainable Smart City in Context. *Journal of Urban Technology*, 55-70.
- Balsa-Barreiro, J., Menendez, M., & Morales, A. J. (2022). Scale, context, and heterogeneity: the complexity of the social space. *Nature Portfolio, Scientific Reports*, 1-12.
- Bibri, S. E. (2019). The anatomy of the data driven smart sustainable city: instrumentation, datafication, Holland, C., Clark, A., Katz, J., & Peace, S. (2007). Social interactions in urban public places. Joseph Rowntree Foundation by The Policy Press, 1-84.
- Kim, Y. A., & Hipp, J. R. (2021). Density, diversity, and design: Three measures of the built environment and the spatial patterns of crime in street segments. *Journal of Criminal Justice*, 1-13.
- Macke, J., Casagrande, R. M., Sarate, J. A., & Silva, K. A. (2018). Smart city and quality of life: Citizens’ perception in a Brazilian case study. *Journal of Cleaner Production*, 717-726.
- Mehta, V. (2019). Streets and social life in cities: a taxonomy of sociability. *Urban Design International*, 16-37.
- Monfaredzadeh, T., & Krueger, R. (2015). Investing social factors in a smart city. *Procedia Engineering*, 1112-1118.
- Nakano, S., & Washizu, A. (2021). Will smart cities enhance the social capital of residents? The importance of smart neighborhood management. *Cities*, 1-21.
- Neves, F. T., Neto, M. C., & Aparicio, M. (2020). The impacts of open data initiatives on smart cities: A framework for evaluation and monitoring. *Cities*, 1-15.
- Sheffield City Council Open Data. (2023, 7 5). Sheffield City Council Open Data. Retrieved from <https://sheffield-city-council-open-data-sheffieldcc.hub.arcgis.com>
- Subiza-Pérez, M., Vozmediano, L., & Juan, C. J. (2019). A systematic social observation tool to measure the restorative potential of urban settings. *Psychology: Bilingual Journal of Environmental Psychology*, 257-267.
- Trencher, G. (2019). Towards the smart city 2.0: Empirical evidence of using smartness as a tool for tackling social challenges. *Technological Forecasting & Social Change*, 117-128.
- Zhao, Z., & Zhang, Y. (2020). Impact of Smart City Planning and Construction on Economic and Social Benefits Based on Big Data Analysis. *Complexity*, 1-11.

Late Submission

The Influence Of Brand Avoidance On Consumers Purchasing Decision

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Abstract: One of the most important factors affecting a company's capacity to achieve a competitive advantage over its rivals is its brand. This paper seeks to examine the impact of brand avoidance on consumer purchasing decisions. Consumers are more likely to be satisfied and have higher expectations when brand managers can offer them high-quality products. Additionally, quality brands have a favourable impact on the consumer's purchasing decision. This study uses a qualitative methodology, notably document analysis, to uncover relevant sources on the subject to achieve the study's aim. Furthermore, a keyword-based search of the databases of Web of Science, Google Scholar, and Scopus was carried out to find seventeen useful scientific papers to reach the study's objective. The findings of the study showed that identity avoidance, moral avoidance, and deficit-value avoidance all had a significant impact on consumers' purchasing decisions through the literature reviewed. As a result, the study offers both theoretical and practical directions on how to succeed in getting away from the underlying reasons for disregard for brands so that consumers make insightful purchase decisions.

Keywords: Brand Avoidance, Consumer Purchasing Decision

1. Introduction

Every organization has its brand that distinguishes them from their competitors in the job market. Most scholars and researchers have shown interest in managers and entrepreneurs to focus on the issues of brand avoidance that influences consumers purchasing decision to accept other brands at the expense of other brands(Martínez-López et al., 2020). Consumers purchasing decision is based on how they view the brand of a product and how they seem to see it as a crucial component of any good or service(Zak & Hasprova, 2020). Brands give consumers compelling reasons to buy an item, whether it is expensive or inexpensive. This link is based on quality. Businesses must make sure their brands are well-known in the marketplace and are accessible and easily identifiable when their names are mentioned which will influence the purchasing decision of consumers(Kokthi et al., 2022). This is due to the ability of businesses to get a competitive edge over rivals in the market environment(Hidayatullah et al., 2019). Every organization has its brand that distinguishes them from others and develop strategies to gain a competitive edge in the job market.

With the help of branding, a business may establish a long-lasting connection with its consumers, which raises demand for its goods and services(Camarero Izquierdo et al., 2005). Due to the nature of its quality, it acts as a foundation for developing a positive reputation for the organization in the international market. To combat avoidance of their brands owing to bad prior experiences with that product, moral wrongdoing, and individual self-concept, business owners should provide quality brands to increase the demand for their brands by consumers(Lee et al., 2012). The inability of businesses to create quality branding features that set them apart from their rivals, especially when it comes to the packaging of their goods or services can encourage brand avoidance by consumers so as far as their purchasing decision is concerned(Rego et al., 2022). Since they will be able to easily avoid or despise the name of your products.

An important factor that influences the consumer purchasing decision on whether to avoid a particular brand over the other is its ability to build a reliable brand in the labour market(Young et al., 2010). Strong brands leave a favourable impression on their customers, have an impact on the consumer purchasing decisions of the potential market, and help businesses forge long-lasting relationships with their consumers(Ferreira et al., 2022). This is why the influence of brand avoidance on the purchasing decision of consumers is the main aim of this study.

Customers will develop the habit of avoiding the purchase of a particular brand if they discover is of low quality and insecure for usage(Sharma, 2020). To develop a relevant connection with consumers, businesses must put in much effort to prevent the habit of brand avoidance among consumers. Many studies have been conducted, with varied degrees of success on the relationship between brand avoidance and consumer behaviour (Khan et

al., 2019a; Khatoon & Rehman, 2021a; Yoon et al., 2020a), however, studies on the influence of brand avoidance on consumer purchasing decision has been overlooked. Therefore, this study to fill this research gap.

2. Literature Review

2.1 Brand Avoidance

Brand avoidance, which results from unfavourable feelings about the brand, is the antithesis of brand intimacy (Park et al., 2013). It is a bad feeling that can appear before the consumer even forms a buying habit, not just after they have already purchased a brand's goods or services (KAYTAZ YİĞİT & İRFANOĞLU, 2021). How consumers emotionally react to, relate to, and feel about a brand affects how they perceive the relationship between the brand and the consumer (Szymkowiak et al., 2021). Studies by (Bryson et al., 2013) reveal that negative past experiences by consumers of a specific brand are the strongest predictor of brand avoidance. Therefore, firms should put proper measures in place to address consumers' complaints and provide solutions to them with the needed urgency it deserves. Brand avoidance is distinct from other ill-will toward a brand such as brand hatred and boycotts in several respects (Odoom et al., 2019). For instance, boycotts, which are anti-consumption and resistance tactics, typically operate at the social/group level and represent commercial unhappiness (Albrecht et al., 2013).

Few studies have qualitatively and conceptually investigated some of the causes, kinds, and aspects of brand avoidance as a multidimensional phenomenon (Odoom et al., 2019). Due to the negative effects, brand managers must work to stop their brands from becoming the target of brand avoidance by consumers in their purchasing decision (Khan et al., 2019b). In general, brand avoidance has been categorized according to the consumer's societal or individual concerns (Cambefort & Roux, 2019). Market activists and other members of social movements are concerned with societal issues, one of their consumer actions can be to boycott products that they believe are contributing to a particular social issue (Rindell et al., 2013). His study's conclusions suggest that the marketing environment, the social environment, or the consumer's environment may all play a role in the purchasing decision to avoid a particular brand (Hogg et al., 2009). Knowledge gleaned from these sources can assist in addressing the problems that lead to avoiding a particular brand over another.

Also, consumers can avoid a specific brand due to their concerns associated with the usage of the brand which could be negative or positive (Dessart et al., 2020a). That is, consumers choose to avoid the brand because of the negative experience associated with the usage of the brand.

Consumers tend to have a consistent purchasing power to brands perceived to be of good quality and meets their expectations (Rayburn et al., 2020). In this scenario, customers will choose to buy excellent brands with a smaller market share in the labour market over those they believe to be easily accessible and affordable (Zhang et al., 2021).

The brand of the company is the consumer's perception and reflection of what the company offers to its consumers and it influences their purchasing decision (Rindell & Strandvik, 2010). While rejection comprises a more passive behaviour that might be challenging to identify or monitor, resistance in the marketplace can take the shape of active behaviour (Hogg et al., 2009). Brand avoidance may be related to the brand user's self-concept congruity of being an active or passive offender (Wijnands & Gill, 2020). This occurs when certain customers believe they are upper-class, thus they fear that purchasing a low-quality brand will reflect poorly on them in society (Li & Whitworth, 2022). Most consumers stay glued to a brand because they want to protect their integrity. It may be seen that consumer complaints do encourage people to avoid a specific brand and it affects the purchasing decision of consumers.

In any situation, customers might find a means to voice their dissatisfaction with a brand to hurt it (Grégoire et al., 2009). He contrasts the brand's expected and intended performance with its actual performance; if expectations are not met, brand avoidance and dissatisfaction result. (W Lee, 2009a). The performance of a particular brand and the context in which the purchase was made are both sources of dissatisfaction (Tamasits, 2021). There is a high possibility that consumers could develop hate for a brand when they perceive the brand to be of poor quality after their experience or usage (KAYTAZ YİĞİT & İRFANOĞLU, 2021). In our current era, where the usage of the internet is appealing in daily life, consumers can easily express their complaints about the usage of a brand digitally or they can evaluate the brand itself through a third website (KAYTAZ YİĞİT & İRFANOĞLU, 2021).

Customers eventually lose all hope of finding a solution and stop doing business with the company (Grégoire et al., 2009). Once they stop doing business with companies, they start looking for other options with the competitors.

2.2 Identity Avoidance

Identity avoidance refers to elements that are connected to the self-concept and the symbolic connotations of the brand (Tamasits, 2021). This means that brand managers should consider using a strong symbolic identity that will give the company a competitive advantage over its rivals (Hoang et al., 2019). The majority of consumers, particularly those with prominent social profiles, avoid product brands whose symbolic logos will impugn their honour. Consumers are more likely to evaluate a brand based on its symbolic attributes first, followed by a functional attribute evaluation, because of their self-relevance, symbolic attributes are easier to process (Kressmann et al., 2006). When consumers practice identity avoidance, they choose a brand that they believe reflects their self-concept and take into account the brand's quality (Tamasits, 2021). In particular, brands are seen to have a "personality" that represents the stereotypical view of the typical brand user—brand-user image (Kolańska-Stronka & Krasa, 2023). Customers try to judge a brand by comparing the brand-user image (also known as "symbolic characteristics") with their sense of self (actual self-ideal self, social self, etc.) (Kressmann et al., 2006b).

They reject specific brands because they wish to distinguish themselves from other consumers who adhere to mass-market tastes (Kovács Kármén, 2009). Consumers tend to step away from brands whose products serve a smaller group of persons in the market (Dessart et al., 2020b).

There is a good chance that some products are better used at home when performing household tasks because they are of poor quality when viewed by others outside of the family (Tamasits, 2021). Consumers who reject a particular brand in favour of their social self-concept are distinguished from those who do so in defence of their "inner-self" by their perception of public feedback, or the opinion or reaction of others. (White et al., 2012)

The negative symbolic meanings a brand has for a person and how those meanings conflict with who that person is are Identity avoidance concepts that inspire (W Lee, 2009). Generally, these two scenarios are simply referred to as the theory of disidentification and negative reference groups (Dessart & Cova, 2021). A consumer may avoid a brand because it represents an undesirable self or has a negative reference group association. (A. Bhattacharya et al., 2020) According to the disidentification theory, customers can improve their self-concept by disassociating themselves from businesses that they feel violate their moral standards (Bhattacharya & Elsbach, 2002).

Although these two ideas appear to be identical, there is a slight difference between them (Knittel et al., 2016). An illustration of identity avoidance is when a particular brand sponsors all of a political party's activities by associating itself with that party (Aziz & Rahman, 2022). Consumers who do not belong to that particular party in issue may as a result avoid the brand in question (Vredenburg et al., 2020a). To encourage consumers to buy their brands and boost long-term productivity, brand managers and business owners must separate their brands from politics (Hoang Tien, Phung Phu, et al., 2019). While the view of unfavourable reference groups may be less accurate and more clichéd, the thoughts of a consumer's undesirable self are definite and distinct (Roy et al., 2022). Click or tap here to enter text. An example of brand avoidance under the category of identity is when a car is perceived to be of a high class and has consequently the car is been avoided due to its inability to serve the brand promises (W Lee, 2009b).

2.3 Moral Avoidance

Idealistic thinking, as a type of moral views, shows an idea that by performing the rightful actions, desirable outcomes will occur (Agag & Colmekcioglu, 2020). It mostly occurs when brands neglect their corporate social resources and changes in government and its policies which directly affect the consumer purchasing decision. (Tamasits, 2021). This could lead to the avoidance of certain brands especially when a new government brings certain policies that hinder the purchase of the brand in question (Arzhanova KA et al., 2020). When consumers believe a brand is associated with a particular political party or affiliation, such that the majority of the party's activities are supported or sponsored in the name of the brand in question, they are more likely to avoid purchasing the brand in question (C. B. Bhattacharya & Elsbach, 2002). This is especially true when the brand is perceived to be associated with the political party in question (French & Smith, 2010). Anti-consumption theory claims that aversion to mass purchase definitely reflects legitimate optimism (Ciasullo et al., 2017). Some consumers decide not to purchase due to the believe it is the right thing to do. An idealist philosophy is also likely

to impact emotions of detachment from a market that embraces the brand principles with scant regard towards wider issues of the environment(Quatro et al., 2007).

Customers may see an organization's donation of aid materials to a political party during a time of dire need as a way for the organization to demonstrate its devotion and allegiance to the political party(Knittel et al., 2016). This can discourage consumers of different political parties from buying the product. Moral avoidance can be grouped into two categories that are by anti-hegemony and country effect(Tamasits, 2021). Customers are more likely to support regional companies that are a part of their community because they feel a patriotic connection to them and because they fit within their expectations(W Lee, 2009b).

2.4 Deficit-Value Avoidance

Another key influence of brand avoidance on consumer purchasing decisions is deficit-value avoidance. Consumers tend to avoid a specific brand when the price of the brand in question does not match the benefits derived from the usage of the brand(Vredenburg et al., 2020b). This means because consumers are price sensitive to their purchase of products of a brand anything related to price insensitiveness will result in the avoidance of the brand in question(Liao et al., 2023). Companies are encouraged to allocate prices by the benefits derived from the brand, of which the price should be reasonable.

When consumers are unsure of the company and believe that using it could harm them, this is another example of a deficit-value situation(Xiao et al., 2022). This might persuade consumers to choose a well-known brand over a lesser-known one if they are conscious of the advantages associated with using it(Silvy Sondari Gadzali, 2023). When it comes to deficit-value avoidance, the issue of the negative experience is not considered since the brand is avoided due to unknown benefits or impact of the brand(Bogomolova & Millburn, 2012).

Consumers might avoid a brand they perceive to have a true reflection of what they classify to be of low quality(Kucuk, 2019). Consumers tend to avoid brands based on their appearance since this category of brand avoidance is not determined by the negative experience of the brand in question(Khatoon & Rehman, 2021b). Marketers employ appealing packaging and models in promotional efforts in the hopes that consumers will associate the brand with their favourable perceptions of attractiveness(Belch & Belch, 2012). As they both refer to expectations that are not fulfilled, one could argue that experience and deficit-value avoidance are two closely related concepts (Knittel et al., 2016). Even though they frequently buy other items from the same brand, consumers may avoid certain foods affiliated with certain value-deficient brands (Hellberg et al., 2016).

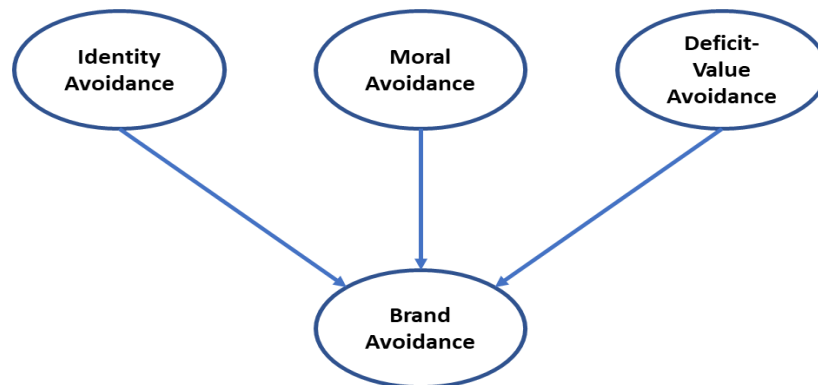


Figure 1: Conceptual Framework: Source: Own Research

3. Methodology

The entire paper is a literature review. The primary technique for this paper was the qualitative method, particularly document analysis. Document analysis was the main method used in this inquiry. Document analysis is the examination and appraisal of documents employing written and electronic data to generate useful results(Stemler, 2000). It was also beneficial for this study considering the use of document analysis offered sufficient evidence for applicable information and materials. The Scopus, Web of Science, and Google Scholar databases were looked through for important details using brand avoidance and consumers purchasing decision as the keyword search. Many research papers on the topic have been accessed based on the desired result (Amoah 2020; Odei et al., 2021). Data search was between the year 2017-2023.To be more precise, out of the numerous articles downloaded, nineteen of them were tremendously used in this paper. According to analysed

information, additional sources connected with the research' insight, the uncovered connected areas were related to the key study elements, brand avoidance. In addition, due to the abundance of literature dealing with the wider topic of brand avoidance. Document analysis is a suitable technique since it offers a broad scenery to examining the disparities of the study's event. The study's themes were usually based on the consumers purchasing decision plan, particularly the concept of brand avoidance. In general, the authors have organized a lot of concepts of pertinent information that they could use document analysis in order to fulfil the study's aims. The aim of this concept was to develop a conceptual mode Based on the intended goal, numerous studies on the subject area were downloaded. It is important to reveal that all the articles downloaded and used in this study were published in English. The researchers clearly dispute the comprehensive analysis of documents and the associated subjects that resulted from the technique used. However, an attempt is being made to demonstrate significantly linked topics of inquiry with the goal to deepen the body of research on the subject under the investigation.

4. Limitation of the Paper

This study may have been strengthened by merging numerous other reputable internet databases that publish on brand avoidance to provide a broader foundation and an overall understanding of the significant issues emphasized and studied in this research. Again, the study lacks empirical support, hence it is very important to use extreme foresight when generalizing the results.

5. Theoretical and Managerial Implications

Although, the quality of a brand seems to be an important tool in determining the success of an organization because are sensitive to the brand of product they purchase for consumption. The decision to examine the factors that motivate consumers to avoid their brands comes from the managerial setting of the firm. This contributes to the understanding of consumers' needs about a specific need and further considers the implementation of new ideas from consumers. Brand avoidance can help consumers avoid unwanted advertising and make more informed purchasing decisions. It will help consumers help consumers avoid products that have negative environmental or social impacts.

Also, management has the advantage of building the reputation of the firm considering the needs and wants of consumers' brands. The implementation of measures that will help consumers patronize a specific brand will lead to an increase in productivity. Brand managers must conduct a customer survey on their brands which will serve as a continuous guide to regulate their activities so far as branding is concerned.

6. Conclusion

In general, brand avoidance mostly occurs when consumers deliberately avoid or neglect a specific brand due to a negative experience or related factors known to the consumer. The findings revealed that consumers exhibit deliberate avoidance of a brand especially when the brand is perceived to be of poor quality and when the content of advertisement is inappropriate to the general public. Identity avoidance and experiential avoidance were the most significant forms of brand avoidance in the literature reviewed. When it comes to brand avoidance, emotions are less outstanding. Brand hate deals with emotions where the consumers attach emotions to the brand making the consumer dislike the brand and neglect the patronage of the brand. Again, the study made use of document analysis as the main methodology approach using Web of Science, Google Scholar, and Scopus databases to retrieve the needed information in executing the objective.

Companies should consider the habit of educating their consumers regularly on the usage of their brands and ensuring that consumers are environmentally friendly to prevent environmental pollution due to over-consumption.

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References

- Agag, G., & Colmekcioglu, N. (2020). Understanding guests' behavior to visit green hotels: The role of ethical ideology and religiosity. *International Journal of Hospitality Management*, 91. <https://doi.org/10.1016/j.ijhm.2020.102679>
- Albrecht, C. M., Campbell, C., Heinrich, D., & Lammel, M. (2013). Exploring why consumers engage in boycotts: Toward a unified model. *Journal of Public Affairs*, 13(2), 180–189. <https://doi.org/10.1002/pa.1473>
- Arzhanova KA, Beregovskaya TA, & Silina SA. (2020). *The Impact of the COVID-19 Pandemic on Consumer Behavior and Companies' Internet Communication Strategies*.
- Aziz, R., & Rahman, Z. (2022). Brand hate: a literature review and future research agenda. In *European Journal of Marketing* (Vol. 56, Issue 7, pp. 2014–2051). Emerald Group Holdings Ltd. <https://doi.org/10.1108/EJM-03-2021-0189>
- Belch, G. E. (George E., & Belch, M. A. (n.d.). *Advertising and promotion : an integrated marketing communications perspective*.
- Bhattacharya, A., Good, V., & Sardashti, H. (2020). Doing good when times are bad: the impact of CSR on brands during recessions. *European Journal of Marketing*, 54(9), 2049–2077. <https://doi.org/10.1108/EJM-01-2019-0088>
- Bhattacharya, C. B., & Elsbach, K. D. (2002). 26 *Journal of Public Policy & Marketing Us Versus Them: The Roles of Organizational Identification and Disidentification in Social Marketing Initiatives* (Vol. 21, Issue 1). www.nra.org;
- Bogomolova, S., & Millburn, S. (2012). Reasons for non-consideration of brands and the role of prior experience. *Journal of Brand Management*, 19(4), 304–317. <https://doi.org/10.1057/bm.2011.41>
- Bryson, D., Atwal, G., & Hultén, P. (2013). Towards the conceptualisation of the antecedents of extreme negative affect towards luxury brands. *Qualitative Market Research*, 16(4), 393–405. <https://doi.org/10.1108/QMR-06-2013-0043>
- Camarero Izquierdo, C., Gutiérrez Cillán, J., & San Martín Gutiérrez, S. (2005). The impact of customer relationship marketing on the firm performance: A Spanish case. *Journal of Services Marketing*, 19(4), 234–244. <https://doi.org/10.1108/08876040510605262>
- Cambefort, M., & Roux, E. (2019). A typology of the perceived risks in the context of consumer brand resistance. *Journal of Product and Brand Management*, 28(5), 575–585. <https://doi.org/10.1108/JPBM-03-2018-1792>
- Ciasullo, M. V., Maione, G., Torre, C., & Troisi, O. (2017). What about sustainability? An empirical analysis of consumers' purchasing behavior in fashion context. *Sustainability (Switzerland)*, 9(9). <https://doi.org/10.3390/su9091617>
- Dessart, L., & Cova, B. (2021). Brand repulsion: consumers' boundary work with rejected brands. *European Journal of Marketing*, 55(4), 1285–1311. <https://doi.org/10.1108/EJM-02-2019-0164>
- Dessart, L., Veloutsou, C., & Morgan-Thomas, A. (2020a). Brand negativity: a relational perspective on anti-brand community participation. *European Journal of Marketing*, 54(7), 1761–1785. <https://doi.org/10.1108/EJM-06-2018-0423>
- Dessart, L., Veloutsou, C., & Morgan-Thomas, A. (2020b). Brand negativity: a relational perspective on anti-brand community participation. *European Journal of Marketing*, 54(7), 1761–1785. <https://doi.org/10.1108/EJM-06-2018-0423>
- Ferreira, P., Faria, S., & Gabriel, C. (2022). The influence of brand experience on brand equity: the mediating role of brand love in a retail fashion brand. *Management and Marketing*, 17(1), 1–14. <https://doi.org/10.2478/mmcks-2022-0001>
- French, A., & Smith, G. (2010). Measuring political brand equity: A consumer oriented approach. *European Journal of Marketing*, 44(3–4), 460–477. <https://doi.org/10.1108/03090561011020534>
- Grégoire, Y., Tripp, T. M., Legoux, R., Fisher, R., Joireman, J., Shaffer, M., Devezer, B., Bechwati, N., Bennett, R., & Sprott, D. (2009). When Customer Love Turns into Lasting Hate: The Effects of Relationship Strength and Time on Customer Revenge and Avoidance. *Journal of Marketing*, 73, 18–32.
- Hellberg, A., Melander, J., Vong, A., & Larsson, J. (2016). *Title: Why Do Consumers Avoid Certain Brands?-A Study of Brand Avoidance within the Swedish Cosmetics Industry*.
- Hidayatullah, S., Firdiansjah, A., Patalo, R. G., & Waris, A. (2019). The Effect Of Entrepreneurial Marketing And Competitive Advantage On Marketing Performance. *INTERNATIONAL JOURNAL OF SCIENTIFIC & TECHNOLOGY RESEARCH*, 8(10). www.ijstr.org
- Hoang Tien, N., Phung Phu, P., Thi Phuong Chi Ho Chi, D., & Thi Phuong Chi, D. (2019). The role of international marketing in international business strategy. ~ 134 ~ *International Journal of Research in Marketing Management and Sales*, 1(2). <http://www.marketingjournal.net>
- Hoang Tien, N., Thanh Vu, N., Van Tien, N., Ho Chi Minh City, in, & Correspondence Nguyen Hoang Tien, V. (2019). The role of brand and brand management in creating business value case of Coca-cola Vietnam. *International Journal of Research in Marketing Management and Sales*, 1(2). <https://www.researchgate.net/publication/338752631>
- Hogg, M. K., Banister, E. N., & Stephenson, C. A. (2009). Mapping symbolic (anti-) consumption. *Journal of Business Research*, 62(2), 148–159. <https://doi.org/10.1016/j.jbusres.2008.01.022>
- KAYTAZ YİĞİT, M., & İRFANOĞLU, M. (2021). MARKA NEFRETİNE NEDEN OLAN KAÇINMA FAKTÖRLERİNİN OLASI ÇIKTILARIYLA BİRLİKTE DEĞERLENDİRİLMESİ. *Pazarlama ve Pazarlama Araştırmaları Dergisi*. <https://doi.org/10.15659/ppad.14.2.255>
- Khan, M. A., Ashraf, R., & Malik, A. (2019a). Do identity-based perceptions lead to brand avoidance? A cross-national investigation. *Asia Pacific Journal of Marketing and Logistics*, 31(4), 1095–1117. <https://doi.org/10.1108/APJML-12-2017-0332>

- Khan, M. A., Ashraf, R., & Malik, A. (2019b). Do identity-based perceptions lead to brand avoidance? A cross-national investigation. *Asia Pacific Journal of Marketing and Logistics*, 31(4), 1095–1117. <https://doi.org/10.1108/APJML-12-2017-0332>
- Khatoon, S., & Rehman, V. (2021a). Negative emotions in consumer brand relationship: A review and future research agenda. *International Journal of Consumer Studies*, 45(4), 719–749. <https://doi.org/10.1111/ijcs.12665>
- Khatoon, S., & Rehman, V. (2021b). Negative emotions in consumer brand relationship: A review and future research agenda. *International Journal of Consumer Studies*, 45(4), 719–749. <https://doi.org/10.1111/ijcs.12665>
- Knittel, Z., Beurer, K., & Berndt, A. (2016). Brand avoidance among Generation Y consumers. *Qualitative Market Research*, 19(1), 27–43. <https://doi.org/10.1108/QMR-03-2015-0019>
- Kokthi, E., Thoma, L., Saary, R., & Kelemen-Erdos, A. (2022). Disconfirmation of Taste as a Measure of Trust in Brands: An Experimental Study on Mineral Water. *Foods*, 11(9). <https://doi.org/10.3390/foods11091276>
- Kolańska-Stronka, M., & Krasa, P. (2023). Masstige as a mediator of the relationship between a typical user's image and brand preference. *International Journal of Consumer Studies*. <https://doi.org/10.1111/ijcs.12920>
- Kovács Kármen. (n.d.).
- Kressmann, F., Sirgy, M. J., Herrmann, A., Huber, F., Huber, S., & Lee, D. J. (2006a). Direct and indirect effects of self-image congruence on brand loyalty. *Journal of Business Research*, 59(9), 955–964. <https://doi.org/10.1016/j.jbusres.2006.06.001>
- Kressmann, F., Sirgy, M. J., Herrmann, A., Huber, F., Huber, S., & Lee, D. J. (2006b). Direct and indirect effects of self-image congruence on brand loyalty. *Journal of Business Research*, 59(9), 955–964. <https://doi.org/10.1016/j.jbusres.2006.06.001>
- Kucuk, S. U. (2019). Consumer Brand Hate: Steam rolling whatever I see. *Psychology and Marketing*, 36(5), 431–443. <https://doi.org/10.1002/mar.21175>
- Lee, M. S. W., Conroy, D., & Motion, J. (2012). Brand avoidance, genetic modification, and brandlessness. *Australasian Marketing Journal*, 20(4), 297–302. <https://doi.org/10.1016/j.ausmj.2012.07.003>
- Li, Y. T., & Whitworth, K. (2022). Redefining consumer nationalism: The ambiguities of shopping yellow during the 2019 Hong Kong Anti-ELAB movement. *Journal of Consumer Culture*. <https://doi.org/10.1177/14695405221127346>
- Liao, J., Guo, R., Chen, J., & Du, P. (2023). Avoidance or trash talk: the differential impact of brand identification and brand disidentification on oppositional brand loyalty. *Journal of Product & Brand Management*. <https://doi.org/10.1108/JPBM-07-2021-3576>
- Martínez-López, F. J., Anaya-Sánchez, R., Esteban-Millat, I., Torrez-Meruvia, H., D'Alessandro, S., & Miles, M. (2020). Influencer marketing: brand control, commercial orientation and post credibility. *Journal of Marketing Management*, 36(17–18), 1805–1831. <https://doi.org/10.1080/0267257X.2020.1806906>
- Odoom, R., Kosiba, J. P., Djamgbah, C. T., & Narh, L. (2019). Brand avoidance: underlying protocols and a practical scale. *Journal of Product and Brand Management*, 28(5), 586–597. <https://doi.org/10.1108/JPBM-03-2018-1777>
- Park, C. W., Eisingerich, A. B., & Park, J. W. (2013). Attachment-aversion (AA) model of customer-brand relationships. *Journal of Consumer Psychology*, 23(2), 229–248. <https://doi.org/10.1016/j.jcps.2013.01.002>
- Quatro, S. A., Waldman, D. A., & Galvin, B. M. (2007). Developing holistic leaders: Four domains for leadership development and practice. *Human Resource Management Review*, 17(4), 427–441. <https://doi.org/10.1016/j.hrmr.2007.08.003>
- Rayburn, S. W., Mason, M. J., & Volkens, M. (2020). Service Captivity: No Choice, No Voice, No Power. *Journal of Public Policy and Marketing*, 39(2), 155–168. <https://doi.org/10.1177/0743915619899082>
- Rego, L., Brady, M., Leone, R., Roberts, J., Srivastava, C., & Srivastava, R. (2022). Brand response to environmental turbulence: A framework and propositions for resistance, recovery and reinvention. *International Journal of Research in Marketing*, 39(2), 583–602. <https://doi.org/10.1016/j.ijresmar.2021.10.006>
- Rindell, A., & Strandvik, T. (2010). Corporate brand evolution: Corporate brand images evolving in consumers' everyday life. *European Business Review*, 22(3), 276–286. <https://doi.org/10.1108/09555341011040976>
- Rindell, A., Strandvik, T., & Wilén, K. (2013). Ethical consumers' brand avoidance. *Journal of Product and Brand Management*, 22(7), 484–490. <https://doi.org/10.1108/JPBM-09-2013-0392>
- Roy, S. K., Sharma, A., Bose, S., & Singh, G. (2022). Consumer - brand relationship: A brand hate perspective. *Journal of Business Research*, 144, 1293–1304. <https://doi.org/10.1016/j.jbusres.2022.02.065>
- Sharma, P. (2020). Impact of Covid-19 on Purchasing Patterns and Consumer Behavior. In *International Journal of Innovative Science and Research Technology* (Vol. 5, Issue 10). www.ijisrt.com890
- Silvy Sondari Gadzali. (2023). Determinants of Consumer Purchases in the Perspective of Business Psychology. *Apollo: Journal of Tourism and Business*, 1(1), 23–28. <https://doi.org/10.58905/apollo.v1i1.9>
- Stemler, S. (2000). An overview of content analysis. *Practical Assessment, Research, and Evaluation*, 7(17). <https://doi.org/10.7275/z6fm-2e34>
- Szymkowiak, A., Gaczek, P., Jeganathan, K., & Kulawik, P. (2021). The impact of emotions on shopping behavior during epidemic. What a business can do to protect customers. *Journal of Consumer Behaviour*, 20(1), 48–60. <https://doi.org/10.1002/cb.1853>
- Tamasits, D. (2021). *Motivations of brand avoidance*. 265–276. <https://doi.org/10.14232/casep21c.19>
- Vredenburg, J., Kapitan, S., Spry, A., & Kemper, J. A. (2020a). Brands Taking a Stand: Authentic Brand Activism or Woke Washing? *Journal of Public Policy and Marketing*, 39(4), 444–460. <https://doi.org/10.1177/0743915620947359>

- Vredenburg, J., Kapitan, S., Spry, A., & Kemper, J. A. (2020b). Brands Taking a Stand: Authentic Brand Activism or Woke Washing? *Journal of Public Policy and Marketing*, 39(4), 444–460. <https://doi.org/10.1177/0743915620947359>
- W Lee, M. S. (2009a). *Brand Avoidance: a Negative Promises Perspective* (Vol. 36). Association for Consumer Research. <http://www.acrwebsite.org/volumes/14318/volumes/v36/NA-36><http://www.copyright.com/>.
- W Lee, M. S. (2009b). *Brand Avoidance: a Negative Promises Perspective* (Vol. 36). Association for Consumer Research. <http://www.acrwebsite.org/volumes/14318/volumes/v36/NA-36><http://www.copyright.com/>.
- Wijnands, F., & Gill, T. (2020). 'You're not perfect, but you're still my favourite.' Brand affective congruence as a new determinant of self-brand congruence. *Journal of Marketing Management*, 36(11–12), 1076–1103. <https://doi.org/10.1080/0267257X.2020.1767679>
- Xiao, Z., Wang, Y., & Guo, D. (2022). Will Greenwashing Result in Brand Avoidance? A Moderated Mediation Model. *Sustainability (Switzerland)*, 14(12). <https://doi.org/10.3390/su14127204>
- Yoon, N., Lee, H. K., & Choo, H. J. (2020). Fast fashion avoidance beliefs and anti-consumption behaviors: The cases of Korea and Spain. *Sustainability (Switzerland)*, 12(17). <https://doi.org/10.3390/SU12176907>
- Young, W., Hwang, K., McDonald, S., & Oates, C. J. (2010). Sustainable consumption: Green consumer behaviour when purchasing products. *Sustainable Development*, 18(1), 20–31. <https://doi.org/10.1002/sd.394>
- Zak, S., & Hasprova, M. (2020). The role of influencers in the consumer decision-making process. *SHS Web of Conferences*, 74, 03014. <https://doi.org/10.1051/shsconf/20207403014>
- Zhang, B., Zhang, Y., & Zhou, P. (2021). Consumer attitude towards sustainability of fast fashion products in the uk. *Sustainability (Switzerland)*, 13(4), 1–23. <https://doi.org/10.3390/su13041646>