



**Proceedings of the
24th European Conference on
Research Methodology for Business
and Management Studies
Hosted by Ulster University,
Derry~Londonderry, Northern Ireland
19-20 June 2025**



**Professor Sandra Moffett
and Dr Andrea Reid**

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**Proceedings of the
24th European Conference on Research
Methodology for Business and
Management Studies**

ECRM 2025

19-20 June 2025

Hosted By

Ulster University

Derry~Londonderry, Northern Ireland

Edited by

Dr Sandra Moffett and

Dr Andrea Reid

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About the 24th European Conference on Research Methodology in Business and Management, 2025

The European Conference on Research Methodology in Business and Management (ECRM) is a long-standing academic conference, held annually for 24 years, dedicated to advancing the understanding and application of research methodologies in the fields of business and management. The conference provides a forum for scholars, researchers, and practitioners to share insights, explore new approaches, and discuss the challenges and innovations in research methods. ECRM is known for its rigorous peer-reviewed proceedings, ensuring that the research presented meets high academic standards. By covering a wide range of methodological issues and innovations, the conference plays a crucial role in shaping the future of research in business and management, promoting the development of robust and impactful research practices.

The Proceedings of the 24th ECRM, 2025 includes academic research papers, a PhD research paper and a Masters research paper as well as a work-in-progress paper, which have been presented and discussed at the conference. The proceedings are of an academic level appropriate to a research audience including graduates, post-graduates, doctoral and post-doctoral researchers. All papers have been double-blind peer reviewed by members of the Review Committee.

Aims and Scope

ECRM enhances the quality and rigor of research in business and management by focusing on the methodologies used in these fields. The conference encourages the development and dissemination of innovative research methods, promotes best practices, and fosters a deeper understanding of the theoretical and practical implications of research methodologies. It serves as a key platform for the exchange of ideas among academics, doctoral students, and practitioners who are engaged in the study of business and management.

The scope of the conference is broad, encompassing both qualitative and quantitative research methods, as well as mixed methods approaches. ECRM emphasises the importance of methodological rigor, the ethical considerations in research, and the application of appropriate techniques to address complex business and management problems.

Topics Covered

The call for papers for the ECRM conference asked for contributions that considered the following topics. In addition, the committee welcomed papers on a number of specialist mini-tracks which can be seen at the end of this list.:

Qualitative Research Methods

- Case Study Research
- Ethnography and Grounded Theory
- Narrative and Discourse Analysis

Quantitative Research Methods

- Statistical Techniques and Data Analysis
- Survey Design and Implementation
- Experimental and Quasi-Experimental Designs

Mixed Methods Research

- Integration of Qualitative and Quantitative Methods
- Triangulation Techniques

Innovative and Emerging Research Methods

- Digital and Online Research Methods
- Machine Learning and AI in Research
- Visual Methods

Philosophical and Theoretical Foundations

- Epistemology and Ontology in Research
- Theory Development and Conceptual Frameworks

Ethics in Research

- Research Ethics and Integrity
- Ethical Challenges in Digital Research

Practical Applications of Research Methods

- Action Research and Participatory Methods
- Consulting and Business Research
- Research in Emerging Economies

Mini Tracks

Experts in the field proposed mini tracks on the following topics. Papers accepted on these topics after the double-blind peer review process were presented as mini tracks at the conference and are also published in these proceedings.

- Mixed Methods for Research
- Quantitative Research Methods in Finance
- The use of AI in Research Contexts

The programme from the 2024 conference can be downloaded from [here](#) and full details about the conference can be seen from the conference website: <https://www.academic-conferences.org/conferences/ecrm/>

ECRM Preface

These proceedings represent the work of contributors to the 24th European Conference on Research Methodology (ECRM 2025), hosted by Ulster University in Derry~Londonderry, Northern Ireland on 19-20 June 2025. The Conference Chair is Professor Sandra Moffett, and the Programme Chair is Dr. Andrea Reid, both from Ulster University.

ECRM is a well-established event on the academic research calendar and now in its 24th year and remains an opportunity for participants to meet and share ideas. The aim and scope of this conference is to bring together researchers from a range of disciplines and sectors to share expertise and novel approaches in business and management research methods. ECRM is interested in contributions on the subject of research methods used in business and management research. The research papers tend to either focus directly on creating and implementing innovative methodologies or highlight an interesting use of methodologies in their study.

The opening keynote presentation is given by Frank Bannister, Fellow Emeritus at Trinity College Dublin, Ireland with the title *A few problems with reality...* On the second day, Dr. Anabela Soares, UWE Bristol, UK will give a talk on the subject *Moving Beyond Traditional Research: Insights, Challenges and Opportunities*.

With an initial submission of 54 abstracts, after the double blind, peer review process there are 17 Academic research papers, 3 PhD research papers and 1 Masters Research paper published in these Conference Proceedings. These papers represent research from Canada, Czech Republic, Finland, Indonesia, Ireland, Northern Ireland, Northern Ireland , Poland, Portugal, South Africa, Sweden, Thailand, UK and USA.

We hope you enjoy the conference.

Professor Sandra Moffett and Dr Andrea Reid
Ulster University
Derry~Londonderry
Northern Ireland

Biographies of Chairs and Keynote Speakers

Conference and Programme Chairs



Professor Sandra Moffett holds a chair in Business Analytics. She has held a number of management positions within Ulster University to include Interim Pro Vice Chancellor and Executive Dean for Ulster University Business School and Head of the Department of Global Business and Enterprise. Professor Moffett has computational and management expertise in the areas of business intelligence and knowledge management, being the first UK PhD researcher in this area. She worked in the School of Computing, Engineering and Intelligent Systems for 18 years (Computer Science) before moving to the Business School in 2018. She is a research active member of staff with over 100 referred publications, substantial research income (+£6m) and many successful consultancy projects (7 Knowledge Transfer Projects and 10 Innovation Boost/FUSION projects). She has designed, built and implemented a number of IT systems for Irish organisations. She regularly hosts conferences and events at local, national and international levels.

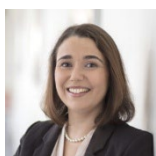


Dr Andrea Reid holds a PhD in Customer Relationship Management (CRM) and a Hons degree in Computer Science with Business Administration obtained from Queens University Belfast. Her PhD project was an investigation into CRM implementation within the Telecommunications sector traced over a ten-year period. Previous work experience includes roles as a Software Engineer, CRM Consultant, Marketing Consultant, Researcher and Policy Officer. Currently a Senior Lecturer in Business Communications within the Ulster University Business School, Andrea's research interests lie within the topics of CRM Implementation within SME's, Artificial Intelligence for business and Data Management and Quality. Andrea regularly presents her research at National and International Conferences. She is a regular reviewer for the Journal of Research in Marketing and Entrepreneurship. Andrea is a member of the Advisory Council of the Institute of One World Leadership and chair of the Ulster University Business School Marketing committee.

Keynote Speakers



Frank Bannister is Fellow Emeritus at Trinity College Dublin. He is a former co-Director of the Permanent Study Group on e-Government in the European Group for Public Administration and has published extensively in the fields of e-government, ICT evaluation, privacy and risk. He was founding editor of the Electronic Journal of e-Government and a former Associate Editor of Government Information Quarterly. He remains an Associate Editor of Information Polity. Frank has acted in an advisory capacity for the Irish government, the European Commission and the United Nations. He is a fellow of the Irish Computer Society, a Fellow of the Institute of Management Consultants and Advisors and a Chartered Engineer.



Dr. Anabela Soares is a Senior Lecturer at UWE Bristol, specializing in Operations and Supply Chain Management. She has contributed with valuable research to the field and is dedicated to sharing her knowledge and insights via her teaching, research activities and international conferences. Profile: <https://people.uwe.ac.uk/Person/AnabelaSoares>

ECRM Review Committee

ECRM is fortunate to have a significant number of international experts in the field willing to review papers. Care is taken to ensure that a fully double-blind peer review process is followed, and reviewers are not selected if they have any research or organisational connection to the author/s.

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Beyond Linear Thinking: Investigating Business-IT Alignment through Complexity Science

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Abstract: Complexity science offers a powerful perspective for studying process theory in Information Systems (IS). Process theory explores how events, actions, and interactions evolve over time. Although complexity science is well-established in other fields, its use in IS research remains limited. In this study, we apply complexity-based methods, particularly mathematical modelling, to deepen our understanding of IS processes. We focus on business-IT alignment as a case example. By building and analysing a dynamic model, we show that alignment follows complex, nonlinear patterns, such as feedback loops, tipping points, and oscillations, that traditional research methods often miss. Our findings highlight how system dynamics and complexity science can reveal hidden structures in IS processes and provide new tools for researchers.

Keywords: Research Methodology, Complexity Science, Business-IT Alignment, System Dynamics Modelling.

1. Introduction

Process theory in Information Systems (IS) research centres on understanding how events, activities, and interactions unfold over time within IS contexts (Burton-Jones et al., 2011; Langley, 1999). It contrasts with variance theory, which typically focuses on identifying relationships between variables and their effects, often using static, cross-sectional data to determine causal links (Burton-Jones, McLean, and Monod, 2015). While variance theory seeks to explain *what* factors lead to particular outcomes by assessing their relative influence, process theory emphasises *how* and *why* these outcomes emerge through sequences of actions and interactions.

When viewed through a complexity science (CS) lens, process theory can be enriched by recognising that many IS phenomena exhibit complex dynamics (Allen and Varga, 2006; Merali, 2006). Processes often involve feedback loops, adaptations, and emergent patterns that cannot be fully explained by static models (Benbya et al., 2020). Despite its maturity in other fields, CS tools of investigation remain underutilised in IS research. While exceptions exist, such as Agent-Based Modelling (ABM) or system dynamics, the broader toolkit of nonlinear dynamics and mathematical modelling has yet to permeate mainstream IS methodologies (Benbya et al., 2020; Fang et al., 2018).

This gap raises the following research question: *How can complexity science modelling approaches enhance our understanding of complex IS processes and provide new methodological tools for IS research?* To address this question, we focus on investigating how a complexity science-inspired research methodology, system dynamics modelling, can contribute to deeper understanding of IS processes, using business-IT alignment as an exemplar case. Business-IT alignment, a persistent challenge for organizations, exemplifies a process that defies static analysis, as it is not a fixed state but a dynamic equilibrium shaped by recursive interactions, delayed feedback, and contextual turbulence (Benbya and McKelvey, 2006; Chan and Reich, 2007).

The present study adopts a mixed-methods, iterative methodology grounded in complexity science. The research integrates longitudinal case analysis with computational modelling to formalise observed dynamics through five key steps: (1) literature review to identify candidate variables and their hypothesised relationships; (2) exploratory case study spanning 36 months to refine variables, map interdependencies, and identify critical feedback mechanisms; (3) development of a system dynamics model expressed through nonlinear equations; (4) iterative testing of alternative mathematical formalisations against case data; and (5) analysis of process trajectories under varying conditions.

This study makes two key contributions. First, it advances theoretical understanding of business-IT alignment by revealing its inherent nonlinear dynamics, including path dependence, delayed feedback, and tipping points. Second, it demonstrates how CS methodologies, particularly system dynamics modelling, can bridge qualitative and quantitative approaches in IS research, offering new tools for studying emergent, context-dependent processes.

2. Literature Review

2.1 Complexity Science: Foundations and Methodologies

Process theory provides valuable insights into how IS phenomena unfold but often relies on narrative descriptions or qualitative categorisations (Langley, 1999). While useful for identifying key phases and transitions, these approaches struggle to capture the underlying mechanisms driving emergent patterns, feedback loops, and nonlinear change. Complexity science complements process theory by offering formal tools to analyse these dynamic processes (Benbya et al., 2020).

Complexity science studies systems characterised by multiple interacting elements, nonlinear relationships, and emergent behaviours that cannot be predicted from individual components alone (Anderson, 1999). These systems exhibit self-organization, adaptation, and sensitivity to initial conditions. Unlike reductionist approaches that focus on isolated elements, complexity science emphasises interconnections and feedback loops (Merali, 2006).

CS methodological toolkit includes different techniques. Agent-based modelling (ABM) simulates the interactions among autonomous agents to observe emergent system-level patterns (Merali & McKelvey, 2006). For instance, ABM has been used in financial markets to model trader behaviour and in supply-demand simulations (Axtell & Farmer, 2022). System dynamics modelling, developed by Forrester (1995), employs stocks and flows to represent system structures and analyse feedback loops, proving valuable in urban dynamics, supply chains, and ecology systems (Sterman, 2001). Mathematical modelling formalises complex behaviour through systems of equations (Strogatz, 2018), widely applied in fields such as biology, physics, and economics (May, 1976).

2.2 Complexity Science and Process Phenomena

Organizational processes exhibit characteristics of complex systems, making CS methodologies particularly suitable for their investigation (Langley, 1999). These processes involve multiple interdependent actors whose interactions generate emergent patterns that defy linear cause-and-effect explanations. Feedback loops shape future conditions, creating dynamic patterns of change, while historical dependencies constrain future trajectories (Merali, 2006).

A complexity perspective on IS processes emphasises the interactions between organizational actors and technological components (Merali, 2006). Complexity science methodologies enable researchers to capture temporal dynamics and feedback mechanisms that variance-based approaches (which focus on static relationships between variables) might overlook. They allow for formalisation and testing of process theories, moving beyond descriptive narratives to explanatory models. Moreover, they uncover counterintuitive effects of interventions, helping organizations anticipate unintended consequences (Benbya et al., 2020).

2.3 Business-IT Alignment as a Complex Process

Business-IT alignment is the ongoing harmonisation of organizational strategies, processes, and technologies (Henderson & Venkatraman, 1993). Rather than a static achievement, alignment is a dynamic process involving continuous adjustments between strategy, structures, and IT capabilities (Karpovsky & Galliers, 2020).

Several characteristics make alignment inherently complex (Allen & Varga, 2006; Benbya & McKelvey, 2006). It involves multiple interconnected elements (technology, organizational structure, processes, and human factors) that interact through feedback loops - e.g., improved IT capabilities enabling new business strategies, which in turn drive further IT investments. Alignment also exhibits time delays - IT implementations take time to yield business value, while organizational adaptation to new systems occurs gradually. Furthermore, small changes in factors like user resistance or management support can have disproportionate effects on outcomes.

Recent studies highlight the dynamic nature of alignment (Luftman et al., 1999; Reich & Benbasat, 2000; Alaceva & Rusu, 2015). Some researchers explore alignment as a gradual process or one characterised by abrupt transitions (Sabherwal et al., 2001). However, these perspectives lack a rigorous description of the mechanisms driving alignment and its corresponding dynamics.

Despite its theoretical promise, the practical application of complexity science in alignment research remains limited. Some notable exceptions exist; Zhang et al. (2019) used ABM to validate co-evolutionary principles in alignment, showing how individual actors' decisions lead to emergent alignment patterns. Peppard & Breu

(2003) applied system dynamics to reveal how feedback loops and time delays influence alignment trajectories. However, the use of other CS methodologies, such as mathematical modelling, nonlinear analysis, and simulation, remains largely unexplored.

3. Research Methodology

3.1 Overview of Research Design

Our research methodology combines qualitative case study research with mathematical modelling, following a mixed-methods approach grounded in complexity science principles (Venkatesh, Brown, and Bala, 2013). This design enables us to capture both the rich contextual details of alignment processes and their underlying dynamic patterns. The methodology consists of five interconnected phases (Table 1): (1) development of an initial system dynamics framework, (2) longitudinal case study investigation, (3) system dynamics model construction, (4) dynamic analysis, and (5) test through comparison with empirical observations.

Table 1: Research Methodology.

Phase	Description	Contribution to the Study
1. Initial system dynamics framework	Development of a conceptual model based on alignment literature and complexity science principles.	Identified key alignment factors (e.g., leadership commitment, resistance) and hypothesised feedback relationships.
2. Longitudinal case study	In-depth investigation of a multinational organization's alignment journey.	Grounded theoretical constructs in empirical data. Refined variables (e.g., resistance thresholds) and revealed real-world feedback loops (e.g., leadership complacency cycles).
3. Mathematical model construction	Translation of qualitative insights into nonlinear equations (stocks, flows, parameters).	Formalised dynamic relationships. Introduced nonlinearities (e.g., tipping points) observed in the case study.
4. Dynamic analysis	Analysis of the model and exploration of alignment dynamics under varying conditions.	Uncovered emergent patterns (e.g., oscillatory regimes, hysteresis) and tested counterfactual scenarios (e.g., delayed IT investments).
5. Empirical test	Comparison of results with the case organization's alignment trajectories.	Tested model realism (e.g., matching tipping points to leadership shifts). Refined parameters (e.g., resistance decay rates) to resolve discrepancies.

3.2 Case Study Selection and Data Collection

To investigate the research question of the study, we selected a large manufacturing company for an exploratory case study aimed at testing the feasibility of constructing a complexity-based model of alignment dynamics. This organization was chosen for four reasons. First, it underwent a significant business-IT alignment initiative spanning five years, providing a rich longitudinal context for studying alignment dynamics. Second, the organization experienced various alignment challenges and successes during this period, offering opportunities to observe both positive and negative feedback loops. Third, the organization's size and complexity provided a suitable context for observing complex dynamics typical of enterprise-wide alignment efforts. Fourth, the organization offered comprehensive access to informants across all organizational levels as well as an extensive collection of secondary sources, including internal documents, project files, and performance metrics.

Data collection spanned 36 months, from mid 2019 to mid 2022, and involved multiple sources to ensure triangulation. Primary data came from 18 semi-structured interviews with key stakeholders across business and IT functions, including senior executives, middle managers, and operational staff. Each interview lasted 60-90 minutes and was recorded and transcribed. Secondary data sources included internal documents (strategy papers, project reports, meeting minutes), alignment assessment reports, and organizational performance metrics. This rich dataset allowed us to track the evolution of alignment processes over time and identify key variables and relationships influencing alignment dynamics.

3.3 Model Development

The development of the mathematical model followed an iterative process that moved between empirical observations and theoretical formulation. Initially, we used a system dynamics approach to identify key stocks (accumulated variables like IT capability, organizational resistance, and alignment level) and flows (rates of change in these stocks). These were derived from both our case study observations and existing alignment literature.

The mathematical formalisation of these relationships involved several steps. First, we translated qualitative relationships identified in the case study into mathematical constructs, using equations to represent change processes. For example, we modelled resistance to change as a stock variable influenced by various flows such as implementation pace, communication effectiveness, and perceived benefits. Second, we incorporated nonlinear relationships observed in the data, such as threshold effects in adoption patterns and diminishing returns in capability development. Third, the model's stocks and variables were operationalised using data from the case study, ensuring empirical grounding.

The modelling process was inherently iterative. As we developed mathematical representations, we frequently returned to the case data to verify and refine our assumptions. This led to several model revisions as we discovered additional feedback loops and refined our understanding of key relationships.

3.4 Model Analysis

The analysis phase involved analysis of the model's properties and nonlinear dynamics. Employing techniques from dynamical systems theory (Strogatz, 2018), we first identified equilibrium points (steady states where alignment, resistance, and commitment stabilise) and assessed their stability. This revealed whether equilibria acted as attractors (stable states the system tends toward) or repellers (unstable states the system diverges from), providing insights into long-term behavioural patterns.

Bifurcation analysis further uncovered critical thresholds (e.g., leadership commitment levels) where qualitative shifts occurred, such as transitions from stable alignment to collapse. These methods collectively showed how the system's behaviour evolves under varying conditions, emphasising nonlinear phenomena like tipping points and regime shifts.

3.5 Test and Theory Development

Model test occurred through multiple mechanisms. We compared analysed trajectories with observed patterns from our case study, focusing on whether the model could reproduce key qualitative features of the alignment process. Then, we presented our model and preliminary findings to key informants from the case organization to verify that the dynamics captured matched their experience.

The insights gained from model analysis were then used to develop theoretical propositions about alignment processes. These propositions focused on the dynamic nature of alignment, the role of feedback loops, and the conditions under which different alignment patterns emerge. The combination of rich empirical data and formal mathematical analysis allowed us to develop theory that is both based on real organizational experience and formally rigorous in its specification of causal mechanisms.

4. Results: Model-based Analysis of Business-IT Alignment Dynamics

4.1 Case Study Narrative

The case organization, a multinational manufacturing firm operating in a stable market with long-term client contracts, began its alignment journey in 2016 with a fragmented IT landscape. Production sites relied on heavily customised legacy systems, while corporate IT lacked governance mechanisms, resulting in ad hoc solutions and minimal integratio.

The 2017 leadership overhaul marked a strategic change. New executives prioritised the integration of IT and business operations, launching ERP consolidation and standardising workflows. From 2017 to 2019, initial improvements in data visibility and operational efficiency created a positive feedback loop: leadership commitment spurred IT initiatives, which in turn enhanced alignment. However, this progress also generated resistance. Employees accustomed to legacy workflows voiced growing frustrations, while department heads observed declines in productivity, early signs of the paradox of progress, where advancements in alignment led to discord.

By 2019, tensions peaked. Supplier integration issues and end-user complaints surged. IT investments took months to translate into operational benefits. Leadership's sustained commitment during this crisis phase proved critical, temporarily offsetting resistance through symbolic actions like CEO-led training programs. Gradually, benefits emerged, standardised interfaces eased supplier collaboration, and improved process efficiency began winning over skeptics.

The 2020–2021 stabilisation phase revealed hysteresis in reverse where overcoming resistance required persistent effort, but visible gains eventually reinforced leadership commitment. Successes enabled expansion to international subsidiaries, demonstrating how alignment can propagate, but only after crossing critical thresholds of trust and capability.

By 2022, alignment exhibited cyclical dynamics. Periods of progress alternated with setbacks as the organization balanced standardisation with local flexibility. This oscillation shows alignment as a dynamic equilibrium, where stability emerges not from stasis but from continuous adaptation to feedback loops.

4.2 System Structure: Key Stocks and Flows

Through analysis of the case data, we identified four main stock variables in the alignment process:

- A(t) - Alignment level: Measuring the degree of harmony between business strategies and IT capabilities.
- T(t) - Top Management commitment: Representing leadership's active engagement in alignment initiatives, manifested through resource allocation and strategic prioritization.
- I(t) - IT Implementation actions: Encompassing the portfolio of technical and organizational initiatives aimed at improving alignment.
- R(t) - Organizational resistance: Capturing the collective resistance to change, influenced by historical experiences and organizational culture.

These stocks interact through feedback loops that drive or hinder alignment. For example, Top management commitment (T(t)) fuels IT actions (I(t)), which enhance alignment (A(t)). However, rising alignment reduces commitment over time as complacency sets in, a pattern observed in the case organization between 2010 and 2017, when perceived success led leadership to deprioritise IT initiatives. Meanwhile, organizational resistance (R(t)) moderates these relationships, as seen during the 2019 alignment push: employee complaints surged due to skill gaps and process disruptions, slowing progress despite increased IT actions. The interactions of stocks are influenced by alignment parameters, such as the efficacy of the IT actions and the Leadership commitment. For each stock and parameters, proxies from the case study were identified (Table 2). For example, A(t) was observed based on feedback provided by C-level managers, R(t) was based on the complaints presented by the end users and collected by the IT department, the Strength of IT department actions on alignment (α) was based on the number of alignment projects launched by the IT department.

Table 2: Stocks and parameters in the model and how they have been assessed.

Stock/Parameter	Description	Case Study Proxy	Data Sources
A(t)	Degree of business-IT alignment	C-level managers' alignment ratings (periodic strategic reviews)	Interviews' transcripts, survey data
I(t)	IT department alignment actions	Number of active alignment projects (e.g., ERP upgrades, workflow standardisation)	Project portfolios, meeting minutes
R(t)	Personnel resistance to change	End-user complaints (IT service tickets)	IT support logs, end-user survey on IT satisfaction
T(t)	Top management commitment	Percentage of leadership meeting time and budget allocated to alignment initiatives	Meeting minutes, financial reports
α	Strength of IT actions on alignment	Correlation between project launches and alignment score improvements	Project timelines, alignment scores
γ	Effectiveness of commitment on IT actions	Ratio of budget allocated to alignment projects vs. total IT budget	Budget documents, project records
δ	Resistance growth rate	Increase in complaints per alignment score unit increase	Complaint logs, alignment scores
η	Leadership's mitigation of resistance	Frequency of leadership-led initiatives (e.g., training, external consultants support hours)	Meeting minutes, event calendars
ϵ	Complacency effect (commitment decay)	Change in the proportion of leadership meeting time allocated to alignment activities as alignment scores increase	Meeting minutes, alignment scores

4.3 Model Formulation: a Nonlinear System

The dynamic interactions between alignment variables were formalised through a system of nonlinear equations. The model is in discrete time, as we observed in the case study that the key events and actions that shape alignment (e.g., budget formulation for IT projects, launch of alignment initiatives, etc.) occur in specific moments in the life of the organization. The model captures key relationships observed in the case study as well as the role of some alignment variables.

$$A(t+1)=A(t)+\alpha \cdot I(t) \cdot (1-R(t)) \quad (\text{Alignment grows via IT Actions, hindered by Resistance})$$

$$I(t)=\gamma \cdot T(t) \cdot (1-R(t)) \quad (\text{IT Actions depend on Leadership Commitment, hindered by Resistance})$$

$$R(t+1)=R(t)+\delta \cdot A(t) \cdot (1-R(t))-\eta \cdot T(t) \quad (\text{Resistance grows with Alignment but is mitigated by Leadership})$$

$$T(t+1)=T(t)-\epsilon \cdot A(t). \quad (\text{Leadership commitment declines as Alignment improves})$$

Alignment at a certain time $A(t+1)$ depends on the previous state of alignment $A(t)$ and the IT department actions $I(t)$, which are moderated by Personnel resistance $R(t)$. In the model, the variables represent:

- α : Strength of IT department actions on alignment.
- $(1-R(t))$: Moderating effect of Personnel resistance.

The IT Department Actions $I(t)$ depend on Top management commitment $T(t)$ (since budget for IT projects is proportional to T) and on Personnel resistance $R(t)$, which hinders IT actions. The variables represent:

- γ : Strength of Top management commitment on IT actions.
- $(1-R(t))$: Moderating effect of Personnel resistance.

The Personnel resistance $R(t+1)$ depends on the previous state of resistance $R(t)$, the Top management commitment $T(t)$, which reduces resistance, and the current level of alignment $A(t)$, which increases resistance (due to complacency or fatigue). The variables represent:

- δ : Strength of alignment's impact on resistance.
- η : Strength of Top management commitment's impact on reducing resistance.

Top Management commitment $T(t+1)$ depends on the previous state of commitment $T(t)$ and on the current level of alignment $A(t)$, which reduces commitment (as alignment improves, the urgency to pursue further alignment decreases). In the model, the variable ϵ represents the Strength of alignment impact on reducing Top management commitment.

4.4 Nonlinear Dynamics and Emergent Behaviours

Analysis of the model revealed some nonlinear dynamics that characterise the alignment process. First, alignment growth exhibits diminishing returns, where initial improvements yield rapid benefits but face increasing resistance as changes penetrate deeper into organizational routines. In the case study, early IT actions (e.g., ERP consolidation) boosted alignment rapidly, but resistance grew proportionally, slowing progress. Beyond a threshold value, Personnel resistance outweighed gains, mirroring the case's 2020 stagnation.

Second, organizational resistance shows hysteresis effects: once resistance passes a certain threshold, it becomes self-reinforcing and increasingly difficult to reverse. In the case study, when resistance reached a high level, reducing it required much greater Top management commitment than before. This was clearly visible in 2021, when the organization had to invest heavily in employee retraining to restore alignment momentum.

Third, Top management commitment shows critical threshold behaviour, where commitment below certain levels can trigger rapid deterioration in alignment initiatives. Below a certain value of the Top management commitment, alignment collapses irreversibly, reflecting the case's near-breakdown in 2017 when leadership attention shifted prematurely.

4.5 Model Test: Comparing Model Analysis and Observed Dynamics

The model's dynamics showed correspondence with observed patterns in the case organization. We identified several key parallels.

Positive feedback dynamics. The initial phase of the transformation program mirrored the model's positive feedback dynamics. Strong leadership commitment, exemplified by the new CEO publicly supporting IT

modernisation, triggered a virtuous cycle: budgetary approvals accelerated IT projects (e.g., ERP consolidation), which delivered quick wins (e.g., streamlined reporting). These successes, in turn, reinforced leadership's confidence, unlocking further resources. Just as the model predicted, early momentum created a self-reinforcing "alignment engine," where trust in IT strategic role grew alongside measurable progress.

Negative feedback effects and the paradox of progress. As alignment improved, resistance to change grew, especially among employees who were comfortable with the existing systems. This resistance created a self-limiting feedback loop that eventually slowed further progress. The model captured this dynamic: rising alignment (A) increased resistance (R), which in turn limited future gains. By 2020, the organization faced this paradox directly, as the improvements achieved through earlier efforts began to stall due to widespread "change exhaustion."

Tipping points and critical transitions. The model analysis identified threshold points where the system's behaviour changed significantly, matching patterns observed in the organization. In the case study, leadership became prematurely satisfied with the alignment progress and shifted focus toward market expansion. As a result, commitment dropped below a critical level. This reflected the model's predicted tipping point, where reduced leadership attention triggered a rapid decline in alignment. IT projects lost priority, resistance grew stronger, and the organization came close to collapse.

Oscillatory behaviour and cycles of crisis and complacency. The model highlighted the cyclical nature of alignment efforts, where periods of strong leadership focus were followed by phases of reduced attention. This pattern reflected the organization's own experience with crisis-driven IT governance. The company often responded to urgent issues, such as production scheduling problems after acquiring major new customers, but then returned to a state of complacency once the immediate crisis had passed. The model reproduced these oscillatory patterns, showing how alignment gains during leadership-driven initiatives, like post-crisis audits, tended to fade during quieter periods, creating a recurring reactive cycle.

5. Discussion

In the present study, we use complexity science as a methodological foundation to explore how the process of business-IT alignment in organizations evolves over time. Guided by the question of how complexity-based modelling can enrich our knowledge of IS processes, we developed and tested a nonlinear system dynamics model grounded in a longitudinal case study. The model shows that alignment emerges from the interaction of competing forces. Leadership commitment pushes the process forward, but progress also generates resistance that slows further improvement. This interplay creates complex dynamics that traditional, linear approaches often fail to capture. Our findings contribute both to alignment theory and to IS research methodology by showing how system dynamics can reveal hidden structures in organizational processes.

5.1 Contributions to Understanding Business-IT Alignment

The first contribution of the study is a deeper understanding of the alignment process in organizations, moving beyond current conceptualisations of alignment as either a gradual, linear process (Chan and Reich, 2007) or one characterised by punctuated equilibrium (Sabherwal et al., 2001). The mathematical description of alignment developed in our study challenges conventional views of alignment as a stable target, instead revealing it as a dynamic equilibrium shaped by interconnected forces.

Our analysis reveals that alignment progress often creates its own obstacles. Early successes in alignment initiatives, such as ERP consolidation, generate momentum but simultaneously trigger unintended resistance. As employees become overwhelmed by rapid changes, they may disengage from the process, creating self-limiting dynamics where alignment's very progress undermines its sustainability. This paradoxical relationship helps explain why organizations often plateau despite increased IT investments, a phenomenon not fully explained by previous static models of alignment (Henderson & Venkatraman, 1993).

Furthermore, our study identifies a critical hysteresis effect in alignment processes, where resistance, once established, demonstrates remarkable persistence. This finding extends previous process-based views of alignment (Chan & Reich, 2007) by showing how historical paths constrain future possibilities. The case organization expensive efforts to rebuild trust after early missteps, such as delayed leadership engagement with training programs, demonstrates how reducing entrenched resistance demands significantly greater effort than preventing its initial emergence. This temporal asymmetry highlights the importance of proactive, rather than reactive, governance mechanisms.

The study reveals a paradoxical trajectory of leadership commitment: while a strong initial focus drives early gains, accumulating progress can lead to complacency, creating vacuums where resistance flourishes. Our model identifies critical thresholds where diminished leadership commitment can trigger rapid alignment collapse. This extends previous research on the role of leadership in alignment (Luftman et al., 1999) by specifying the dynamic mechanisms through which leadership influences operate. Additionally, this finding enhances the complex adaptive systems view of alignment (Benbya & McKelvey, 2006) by offering a more nuanced understanding of the nonlinear dynamics involved.

Furthermore, the study insights bridge the gap between "alignment as a state" (emphasising alignment factors) and "alignment as a process" (focusing on temporal evolution). By formalising how factors interact dynamically, the model explains why organizations oscillate between harmony and discord, a pattern that static models struggle to capture.

The deeper understanding of the complexity of the process offers valuable suggestions for practitioners. Organizations can utilise these insights to identify critical factors in their alignment process, leveraging positive feedback loops while mitigating negative ones. C-level executives may also use the insights of the model to assess in a more insightful way the alignment trajectories of their organizations and define effective actions. For example, when faced with a reduction in alignment, understanding whether the dynamics are caused by ineffective actions or are the result of a complex evolution which alternates alignment and misalignment helps executives make more informed decisions.

5.2 Contribution to IS Research Methodologies

The second major contribution of our study lies in extending the methodological toolkit available to IS process researchers. Beyond alignment, this study shows how complexity science methodologies can advance IS research more broadly. Traditional approaches, whether qualitative (e.g., case studies) or variance-based (e.g., regression analysis), struggle to capture the recursive and context-sensitive nature of IS processes (Merali, 2006). Our model addresses these limitations by revealing hidden patterns and clarifying causal mechanisms through proactive exploration.

Nonlinear analysis uncovered dynamics invisible to static methods, such as delayed feedback (e.g., IT investments taking months to impact workflows) and oscillatory regimes (e.g., crisis-driven "firefighting" followed by complacency). By forcing explicit links between variables (e.g., how top management commitment mitigates resistance), the model moves beyond what factors matter to why and when they matter. This approach extends prior work on complex adaptive systems in IS research (Allen and Varga 2006; Benbya and McKelvey 2006; Merali 2006) by providing a more granular understanding of the interplay between various alignment factors and how they shape the alignment process.

The model serves as a "virtual lab" to test interventions (e.g., staggered IT rollouts vs. big-bang implementations), offering insights into leverage points and unintended consequences. This capability addresses the call for more dynamic and adaptive approaches to studying IS phenomena (Benbya et al., 2020; El Sawy et al., 2010).

This methodological contribution shifts IS research from post-hoc explanation to generative understanding, where processes are studied as systems of interacting forces rather than linear sequences. For contemporary phenomena like digital transformation or AI adoption, where outcomes depend heavily on adaptation and emergence, complexity-aligned methodologies offer a lens for understanding organizational dynamics.

This study has some limitations. It is based on a single case and relies on perceptual measures, such as assessments of leadership commitment, which restrict the generalisability of the findings. Future research could address this limitation by conducting multi-case studies and incorporating sensor-based data, such as workflow telemetry, to capture organisational dynamics more objectively. Although our focus was on business-IT alignment, the modelling approach is adaptable. Similar methods could be applied to other complex IS processes, including cybersecurity incident response and platform ecosystem governance, where feedback, adaptation, and nonlinear change also play critical roles.

Ethical Declaration

Ethical clearance was not required for the research presented in this study.

AI Declaration

AI was not used for the creation of the present paper, EditGPT was used for text proofreading.

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A Set of Proposed Moral Principles for Knowledge Accumulation

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Abstract: Design Science Research (DSR) frequently develops artefacts in isolation from users. We propose moral principles to establish standards of good conduct for DSR researchers concerning community needs. The research question is: What moral principles can guide DSR researchers in reusing, developing, and sharing knowledge within the community? Drawing on perspectives of virtue, deontology, and consequentialism, our proposed moral principles focus on understanding community needs, constructing valuable knowledge, reusing existing knowledge, and co-educating the community.

Keywords: Design Science Research, Community Solution, Community Sharing, Researcher Participation

1. Introduction

Researchers apply the Design Science Research (DSR) methodology to build knowledge that can be used to design, implement, and evaluate solutions. A growing stream within previous DSR research has recently noted that DSR researchers tend to develop their knowledge and related solutions in isolation from the users and other research initiatives (Nguyen et al., 2019, Vom Brocke, Winter, Hevner and Maedche, 2020, Diaz et al., 2021, Schoormann et al., 2021, Reining et al., 2022, Tuunanen and Holmström, 2021). This isolation makes it hard to evaluate knowledge, solutions, and their quality. The lack of reuse of previous knowledge explains that while knowledge is created within communities and sub-communities, “finding the right way of describing [the knowledge] and interlinking new [knowledge] with existing [knowledge] is challenging across multiple projects.” (p. 33). The research problem involves accumulating and reusing knowledge within DSR communities, which poses an existential threat to DSR, as its highest purpose is to build knowledge that others can use to solve problems, drawing on the collective strength of many experts rather than personal experience. The risk of not reusing knowledge includes an ineffective research process, diverging results, and a diminished status among other researchers due to the formation of monoliths.

DSR researchers have given various propositions to counter the above problem, such as adopting an ontological approach (Nguyen et al., 2019), adding a refactoring cycle to Hevner’s three cycles (Diaz et al., 2021), following an organizing framework in research (Tuunanen and Holmström, 2021), and modelling of scientific DSR progress (Reining et al., 2022). Concurrently, solutions have been developed; tools and methods are available to synthesise existing DSR knowledge (e.g., Vaishnavi, 2007, Dresch et al., 2015). Their creation and application in isolation still indicate less need for additional solutions, but rather a shift in how DSR researchers conduct their research. We believe a minor adjustment could alleviate the knowledge accumulation problem by transitioning from the problem-solving paradigm to an axiological one. An axiological paradigm centres on social systems that arise from the desired behaviours and characteristics of DSR researchers. Behaviours that foster community could be perceived as positive, while behaviours that promote isolation could be seen as unfavourable, reflecting the intent of established moral principles. Previously, (Myers and Venable, 2014) have proposed six moral principles for DSR researchers: (1) the public interest, (2) informed consent, (3) privacy, (4) honesty and accuracy, (5) property, and (6) quality of the artefact. However, these principles do not cover knowledge accumulation. This paper proposes a set of moral principles to guide DSR researchers in reusing, developing, and sharing knowledge as part of a community. A moral principle is a moral rule or standard of good behavior that promotes reflection and thoughtfulness beyond specific solution design. This type of principle aims towards reflection and thoughtfulness in action, going beyond the design and implementation of specific solutions, helping to organize and participate in social systems. This research is a response to the call of (Herwix et al., 2022) who advocated for a more systematic and deliberate engagement with axiology in DSR. Our research also contributes to the six moral principles (Myers and Venable, 2014), igniting a debate regarding the assumed moral principles of previous DSR research and its knowledge accumulation, thus taking a step towards a moral theory for DSR methodology. The following research question guided this investigation:

RQ: What moral principles may guide DSR researchers in reusing, developing, and sharing knowledge as a community?

The article includes related works, proposed moral principles for knowledge accumulation, and illustrations from two studies. It discusses both good and bad research, the morals of engaging a community, applications, and challenges.

2. Previous Research

This section includes proposed moral principles, virtue, deontology, and consequentialism

2.1 An Axiological Paradigm

Axiology refers to basic beliefs about ethics and value (Funk, 2001), including the systematizing, defending, and recommending of moral principles of good behaviour (Fieser and Dowden, 2011). It asks a researcher to guide his or her conduct by reason while giving equal weight to the interest of others affected by his or her actions (Rachels and Rachels, 2019). For example, (Vom Brocke, Winter, Hevner and Maedche, 2020) stress the importance of DSR as a collaborative, evolutionary endeavour, which builds upon previous knowledge to create new knowledge. Generally, moral principles can be understood using three normative ethics: virtue ethics, deontology, and consequentialism (Rachels and Rachels, 2019, Herwix et al., 2022).

1. **Virtue** ethics relates to what it means to be a good researcher, empathizing the roles of ideal character traits and environment (e.g., education, society, and family) (Athanasoulis, 2004, Rachels and Rachels, 2019, Herwix et al., 2022). For example, in the case of (Vom Brocke, Winter, Hevner and Maedche, 2020), a virtuous DSR researcher reuses and shares knowledge.
2. **Deontology** concerns a researcher's rights, duties, and permissions. It highlights morally required, forbidden, or permitted actions while guiding and assessing a researcher's actions (Alexander and Moore, 2021, Herwix et al., 2022). For example, plagiarism is a forbidden act (Davison et al., 2004), while the problem of knowledge accumulation (Vom Brocke, Winter, Hevner and Maedche, 2020) is based on an assumed duty for DSR researchers to build knowledge together.
3. **Consequentialism** focuses on the consequences of actions. It explores the nature of good and bad consequences, and who experiences these consequences (Sinnott- Armstrong, 2021, Herwix et al., 2022). For example, a core idea of DSR is that the research improves, innovates, or extends solutions to solve problems, while contributing to knowledge development (Gregor and Hevner, 2013).

However, no normative ethics can satisfactorily answer good and destructive behaviors. Virtue ethics is challenging to apply in complex situations. It cannot resolve moral conflicts, deontology fails to see contextual nuances, and consequentialism allows for horrible actions in the name of good. Instead, they can be viewed as supplementing each other (Rachels and Rachels, 2019). The three normative ethics can be identified in previous DSR research. (Myers and Venable, 2014) proposed six moral principles for DSR researchers, which we present in Table 1 connected to the three normative ethics.

3. Research Approach

Previously, we conducted two DSR projects and are knowledgeable in ethics and morality. As we worked on these projects, we came in contact with the knowledge accumulation problem in previous DSR research and found that it is a focus for some (Nguyen et al., 2019, Vom Brocke, Winter, Hevner and Maedche, 2020, Diaz et al., 2021, Reining et al., 2022, Tuunanen and Holmström, 2021), which was surprising as we had not experienced it.

We returned to the method descriptions of our DSR projects, studying them for good and bad behaviours. Our DSR projects are chosen due to our internal depth of knowledge.

Table 1: Myers and Venable (2014) proposed six moral principles connected to the three normative ethics.

Ethical Principle	Description	Normative Ethics
The Public Interest	Identify stakeholders and consider how they may be affected by the research output.	Consequentialism
Informed Consent	Obtain informed consent from participants in the research.	Deontology
Privacy	Safeguard privacy of stakeholders.	Deontology

Ethical Principle	Description	Normative Ethics
Honesty and Accuracy	Do not plagiarize ideas. Acknowledge inspirations. Be honest.	Deontology and Virtue Ethics
Property	Ensure ownership Agreements and rights to publish.	Deontology
Quality of the Artefact	Every attempt should be made to ensure the artefact's quality. Design should account for and address risks. Ensure safe use.	Consequentialism and Deontology

from enacting the research and the ease of comparison. The return process was supported through retrospection and discussions. We brainstormed tentative moral principles to cover our behaviours on a digital collaborative surface. It was possible to identify a tentative set of moral principles. As such, we revisited previous research on ethics to identify normative ethics that could help us develop the tentative set of moral principles. We identified three normative ethics (see Section 2.1) using them as design tools. We perceived each moral principle from normative ethics, filling in further details. Virtue ethics highlighted the ideal character traits and the environment of DSR researchers. Deontology emphasised the duties and rights of DSR researchers. Consequentialism stresses outcomes and stakeholders.

4. A Set of Proposed Moral Principles for Knowledge Accumulation

This section presents a set of proposed moral principles that have been constructed to guide DSR researchers when reusing, developing, and sharing knowledge as part of a community, driving a collective process of problemsolving. A moral principle is written to be universal and general, making no essential references to particular people, times, or places. Any particularities are captured through concepts and roles. Its content may range from quite narrow (covering only one case) to highly general (covering all cases) (Väyrynen, 2018).

Our first moral principle is theoretical in nature, placing a standard for DSR research to be considered to have a moral feature, such as rightness or wrongness (Väyrynen, 2018). A society with problemsolving experts is desirable since they can work to overcome, for example, poverty, starvation, and disease, but also bring about a better tomorrow. They can help society avoid or mitigate disasters, such as earthquakes, forest fires, and war. The backbone of this expertise is a knowledge base used to educate and inform experts, helping them solve problems. However, this base requires constant knowledge accumulation, as, with time, things change, disappear, and new problems emerge (See, e.g., Caiden, 2017). While the DSR methodology refers to a collective enterprise set out to solve problems, **DSR researchers act to accumulate a knowledge base that helps experts solve problems.** Help (The Cambridge Dictionary, 2019) in this context means knowledge should make it possible or easier for experts to solve problems, as the DSR researchers have done part of the problem-solving and provided this knowledge.

Based on the above theoretical moral principle, we have constructed practical moral principles, which can guide research activities and decisions of DSR researchers. These principles are constructed to help DSR researchers realize our theoretical moral principle. As such, knowledge accumulation. The practical moral principles are as follows.

First, **DSR researchers explore an expert community's knowledge needs**, as the intention is to help experts solve problems. It requires them to be knowledgeable about the community and when and how to solve the needs. Researchers who engage a community with curiosity can quickly move to the edge of the community's knowledge development, allowing them to identify novel gaps and opportunities. The development of knowledge or solutions for these gaps or opportunities has a higher likelihood of being relevant, even if only for that community. Relevance is, therefore, based on a knowledge contribution's possible ability to progress a community towards satisfying solutions.

Second, **DSR researchers construct helpful knowledge for experts**, necessitating an understanding of the community as the audience for this knowledge. If researchers intend for experts to utilise their knowledge, they must take into account its applicability for the audience. It is crucial to consider the experts' language, preferred medium and communication format, as well as the concepts employed. This demonstrates a commitment to service and consideration for future generations, reflecting an admirable trait of responsibility. The focus on reuse facilitates the emergence of a valuable knowledge base for experts, while also allowing researchers to utilise knowledge to respond more swiftly and enhance

creativity. More importantly, it empowers experts to create original knowledge and make contributions to the knowledge base. DSR researchers must adapt to the experts’ paradigm. However, neglecting this moral principle may lead experts to find knowledge incomprehensible or perceive it as irrelevant to their work; consequently, they might attempt to reinvent the wheel or struggle to resolve a problem. The knowledge base may become a collection of isolated fragments, each reiterating solutions to problems that have already been addressed, thus squandering resources and hindering collaboration.

Third, **DSR researchers reuse the knowledge base**, evaluating and validating this knowledge, but also questioning its helpfulness. It is a sign of respect and consideration for others’ wisdom. This reuse allows a stable knowledge base to emerge where researchers can save time and avoid redoing previous pitfalls. More importantly, it provides the grounds to argue for original knowledge contributions and to scrutinise for further developments. DSR researchers have a duty to meta-discuss the helpfulness of knowledge, keeping other DSR researchers accountable, as part of discovering helpful knowledge. The inability of knowledge to help experts is an important motivation for DSR research. An argument to set out on a new research project. On the other hand, a failure to properly draw on previous knowledge risks accusations of plagiarism and purposefully reinventing the wheel.

Fourth, **DSR researchers participate in the co-education of the knowledge base**, following the educational processes of the expert community, while drawing on a broad theoretical and practical knowledge base. Experts’ understanding of problems and the development of solutions change over time. These changes can help researchers identify dead ends, requirements, and needs. It is possible that experts are ahead of DSR researchers in the knowledge development process, as such following them can provide clues where the next key knowledge contribution may be made. At the same time, a community is an important outlet for any produced knowledge, where its presentation and discussion can provide new opportunities and avenues. The pedagogical ability to learn with and teach experts is an ideal character trait for DSR researchers. However, disregarding this moral principle, means that constructed knowledge may never reach the experts, but also that key insights into how to solve the problem from within the community never reach the researcher.

Table 2 presents a summary of the above proposed moral principles for knowledge accumulation. Each principle has been connected to the three normative ethics, highlighting their role and influence.

5. Illustrations

We conducted two DSR projects as part of the Open Government Data (OGD) community. OGD refers to data shared by public organizations (in the role of providers) to be reused by anyone at any time and anywhere without restrictions (Attard et al., 2015, Handbook, 2015, Hossain et al., 2016). Journalists, students, researchers, and developers (in the role of users) enrich OGD into various solutions for the public. Generally, the community experiences problems solved by OGD (e.g., lack of transparency)

Table 2: A Set of Proposed Moral Principles for Knowledge Accumulation

DSR re-searchers...	Virtue Ethics	Deontology	Consequentialism
Act to accumulate a knowledge base that helps experts solve problems	Academic, Problem Solver	Knowledge Accumulation	A Better Tomorrow
Explore an Expert community’s knowledge needs	Curiosity, Problem-Finder	Engage Experts	Relevancy
Construct helpful knowledge for experts	Service, Responsibility	Adjust to the Expert Paradigm	Helpfulness
Reuse the knowledge base	Humbleness, Expertise	Reuse knowledge	Originality

DSR re-searchers...	Virtue Ethics	Deontology	Consequentialism
Participate in co-education of the knowledge base	Collaborative, Pedagogic	Exchange knowledge	Impact

and data as an untapped resource), problems of OGD (e.g., how to make anyone be able to discover and understand the data), problems in OGD (e.g., low return on investment for providers and low data quality for users), and problems from OGD (e.g., violations of privacy and distortion of data) (Crusoe, 2021). Our two DSR projects focused on problems of OGD, which was common within the community (following step 1 in DSR by (Peffer et al., 2007)). Two common problems are as follows. First, how to transform the open data into something with utility or value for others. Some suggested solutions are (Davies, 2010, Lindman et al., 2016, Portal, 2017). Second, how to publish data as open data? Examples of solutions are (Hyland and Wood, 2011, Lee, 2014, Nečaský et al., 2014, Zuiderwijk et al., 2014, Naturvårdsverket, 2018). The first of our DSR projects focused on the first problem, while the second of our DSR projects focused on the second problem.

5.1 Illustration 1: The User Framework

The first DSR project resulted in our article (Crusoe and Ahlin, 2019), where we created a conceptual framework for the user process related to OGD. Overall, we worked closely with the OGD community and analyzed the literature and empirical material in various inductive, abductive, and deductive steps. The method can be summarized as three steps: (1) create a tentative framework, (2) a formative evaluation of the tentative framework, and (3) a summative evaluation of the framework. The steps were iterative and longitudinal. We worked iteratively in the first step with research articles to create a skeleton framework from a sketch. This step aimed to synthesize previous knowledge about the solutions and their related problems. We selected one article as sketch and filled the sketch with previous knowledge based on a goal-oriented literature review, adding missing data to the skeleton. The second step started with a formative evaluation, where we demonstrated and evaluated the tentative framework as a practical test. The tentative framework was tested to compare two contexts. We chose these contexts to get feedback and increase generalization (Crusoe et al., 2019). The third step was a summative evaluation, adding to the broader scope of the tentative framework. We refreshed the tentative framework through a systematic literature review. Then, we created templates from the framework, which we used as templates for interviews.

Table 3: Illustration 1

Moral Principle	Examples
DSR researchers explore an expert community's knowledge needs	Participated in OGD forums; Talked with OGD experts; Noted a focus of reuse of data, but little understanding of its process
DSR researchers construct helpful knowledge for experts	Identified that experts used process-descriptions to communicate around the problem
DSR researchers reuse the knowledge Base	Started building the framework from a scientific article; Knowledge base as an input to the construction of the framework
DSR researchers participate in co-education of the knowledge base	Presented the frameworks in lectures and seminars; Wrote and distributed a popular science article; Interviewed experts

5.2 Illustration 2: The Provider Framework

The second example is based on our article (Crusoe and Ahlin, 2022), where we created a conceptual framework for the provider process related to OGD. Overall, we worked closely with the OGD community and analyzed the literature and empirical material in various inductive and abductive steps. The method can be synthesized in two steps:

(1) create a skeleton framework and (2) demonstrate and evaluate the framework, supported by (Peffer et al., 2007). Our initial step began with desktop research, and we utilised these findings to create a sketch while incorporating results

from an exploratory literature review. This was followed by conducting exploratory interviews. The empirical material was analysed, enriching the sketch framework and forming a skeleton. Subsequently, OGD experts assessed the skeleton framework through interviews based on a popular scientific article. The second step concentrated on demonstrating and evaluating the skeleton framework, gathering feedback, using that feedback to construct a tentative framework, and reflecting on the tentative framework. We began collecting feedback by discussing the skeleton framework at an academic workshop focused on e-government (Crusoe and Ahlin, 2020).

Table 4: Illustration 2

Moral Principle	Examples
DSR researchers explore an expert community's knowledge needs	Followed the developments in the OGD community; Noted researchers and practitioners attempting to solve the same problem
DSR researchers construct helpful knowledge for experts	Identified that public organizations shared knowledge following a form of work framework
DSR researchers reuse the knowledge Base	The knowledge base was used to construct the work framework
DSR researchers participate in co-education of the knowledge base	Interviewed experts; Meeting with Experts

6. Discussion

This section explores the concept of morally good and bad DSR research, the moral implications of engaging an expert community, and the potential application of our moral principles, as well as any related challenges.

6.1 Morally Good or Bad Research?

An axiological paradigm entails questions about good and bad actions and consequences, supported by good reasons for these classifications (Rachels and Rachels, 2019). It goes beyond understanding what is good and bad, but also why (Väyrynen, 2018). While our moral principles are formulated following law-like generalizations, they are based on the idea of good and bad as a spectrum (see differences between Table 3 and Table 4). In this case, “good” refers to actions contributing to knowledge accumulation, while “bad” refers to actions hampering knowledge accumulation (Sinnott-Armstrong, 2021, Gregor and Hevner, 2013). The principles’ general nature also allows various approaches to fulfilling them, but also an ability to judge if research activities are working towards this fulfilment. Attached to the axiological paradigm is the idea of encouraging good actions while discouraging bad actions, which needs to be proportional to the degree of goodness or badness (Fieser and Dowden, 2011). In the case of DSR, researchers want knowledge accumulation to take place (Nguyen et al., 2019, Vom Brocke, Winter, Hevner and Maedche, 2020, Diaz et al., 2021, Schoormann et al., 2021, Reining et al., 2022), as such it could be tempting to severely discourage any failure to fulfil our moral principles (knowledge accumulation). However, this approach could discourage innovation and risk-taking, hampering knowledge development (vom Brocke, Hevner and Maedche, 2020). Another approach is to understand why a DSR project failed in contributing to knowledge accumulation; drawing lessons learned, which can help researchers avoid similar situations in the future (Nguyen et al., 2019, vom Brocke, Hevner and Maedche, 2020, Diaz et al., 2021, Schoormann et al., 2021, Reining et al., 2022, Tuunanen and Holmström, 2021). As a result, DSR researchers should cultivate a culture where knowledge accumulation is praised and rewarded as morally good.

6.2 Moral to Engage Community

Engaging within a community is fundamental to our proposed moral principles. Therefore, it is essential to understand which community we focus on (vom Brocke, Hevner and Maedche, 2020) While finding out what the community looks like, the next step is understanding how to enter it. In a community with stated norms, there might be an official way to enter it, while for the more loosely coupled community, networking could be one way. Still, it takes time to enter and understand a community and market yourself as a contributing partner. There are several ways to contribute, and one way is to present and discuss knowledge contributions with interested parts of the community, emphasised by (Gregor and Hevner, 2013). One essential part is to find the communities or persons interested in collaborating. The implication is that DSR researchers’ moral goodness depends on other actors.

6.3 The Application of the Principles

The created moral principles can be applied in various ways. One way is to incorporate them into the conducted activities of DSR, e.g. the DSR process. The understanding of the moral principles and their implication on the research process must be discussed between researchers to adjust to the specific context, e.g. how to understand the community and how to approach it. The moral principles then act as a basis for reflection and can also be viewed as a purposeful motivator for the research design (Fieser and Dowden, 2011, Rachels and Rachels, 2019). Researchers can also approach moral principles in various stages of their knowledge of research design, such as practitioners, PhD students, Senior Lectors, or Professors. Therefore, the variation in applying the moral guidelines could vary but still, be helpful in their described generality. As well as the content of the moral principles, their possible consequences vary, e.g. described by (Herwix et al., 2022, Sinnott-Armstrong, 2021). One consequence could be the impact on the community, as well as other impacts on future research.

7. Conclusion

This paper proposes a set of moral principles for researchers' knowledge accumulation in DSR. This set can be used as an evaluation framework for DSR research, adding to its scientific status and ability to accumulate knowledge. The set is based on a theoretical moral principle as a standard for good DSR research: "*DSR researchers act to accumulate a knowledge base that helps experts solve problems*". We supplemented this theoretical principle with four practical moral principles, acting as guides for DSR researchers who should: (1) explore an expert community's knowledge needs, (2) construct helpful knowledge for experts, (3) reuse the knowledge base, and (4) participate in co-education of the knowledge base. The general nature of the moral principles' challenges DSR researchers to discuss their meaning and implications for their research, while also giving them the opportunity to identify their limitations as new moral territory.

There are limitations to this paper. The proposed set of moral principles was developed based on two previously conducted DSR projects, meaning we are reflecting in retrospective. The development process was made in retrospect, giving us insight into what worked and what did not. A consequence was that the degree of moral fulfilment differed between the illustrations, emphasising the importance of a moral spectrum. While the general nature of the moral principles can make them difficult to apply, it encourages DSR researchers to justify their research deliberately.

Future research should work to explore further moral elements of DSR beyond knowledge accumulation. For example, the moral nature of knowledge evaluation and solving problems. It is time to open a nuanced discussion about good and bad DSR research practices, helping us to understand the full expression of a moral theory for DSR research. A tentative next step could be to develop one or more theoretical moral principles for why and how DSR research is good.

Ethics Declaration

No ethical clearance was required for the research.

AI Declaration

No AI tools were used for conducting the study or writing the article.

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Using Systemic and Praxeological Approaches for Modeling Social Impact Assessment of Research

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Abstract: By assessing the impact of scientific research, it is possible to track the effects of previously undertaken research initiatives, adapt subsequent ones to current social needs, and strengthen public trust. Assessment results influence decisions regarding selecting and modifying research financing strategies, creating innovation policies to ensure significant benefits for local and regional communities, and sometimes even of global significance. In the process of building models of this type of assessment, the concept of an action system and praxeological analysis can be used, which is one of the methods of goal-oriented explanation. This paper aims to demonstrate how the systems approach and praxeology can be applied to model the social impact assessment of scientific research. By using these approaches, the key elements of the action system and their interrelationships were identified. This enabled the development of a general model for the assessment system, which can be further refined based on the specific characteristics of information and decision-making processes. This model lays the foundation for a new methodological direction in evaluating the impact of scientific research. System analysis provides opportunities for a rational way of solving complex and interdisciplinary problems related to socio-economic and technical systems. The obtained research results confirm that combining systemic and praxeological approaches is useful for interdisciplinary modeling and improving goal-oriented systems. Such approaches enable a good understanding and structuring of the evaluation problem and reflect its complexity and multi-aspect nature. The universality of the proposed solutions creates the possibility of continuing research on expanding the scope of classical praxeological and systemic considerations towards applications of computer systems supported by artificial intelligence algorithms.

Keywords: Systems Approach, Praxeology, System of Action, Model of the Assessment System, Social Impact of Scientific Research

1. Introduction

Research centres in different parts of the world are interested in directing research results towards sustainable society development and improving social impact assessment to support sustainable and socially beneficial initiatives (Areesophonpichet *et al.*, 2025). The criteria for assessing research projects carried out within various programs, e.g., Horizon (excellence, impact, and quality and efficiency of the implementation), are generally consistent with the assumptions of the classical science of efficient action (praxeology, praxiology). Within the classical praxiological studies, sub-disciplines were created in connection with the needs in the area of planning, supporting decision-making, conducting evaluation, and other quite close business and management studies (Gasparski, 1987). The Polish Praxiological School has made a significant contribution to proposing the application of the terminology of praxeology as a basis for developing metatheory for management sciences, praxiological systematization of management sciences, and the idea of praxiological efficaciousness (Szpaderski, 2006).

It is interesting to reach for classical approaches when considering the effects of actions taken in connection with scientific research. The conscious, purposeful, complex and unique human actions related to them, which are aimed at achieving the intended goals, should be accompanied by in-depth reflection on the effects in the broadly understood societal impact. Such analyses should be conducted drawing on the rich achievements related to the systemic praxeological trend and the systems approach close to it. These approaches are very general in nature, which makes them of an application nature and facilitates the construction of assessment models with universal properties, i.e., referring to very diverse, complex, and unique scientific and research projects. Forecasting expected social effects, tracking them during the implementation of activities, and examining the achieved effects is close to the issues of quality management and management studies.

The problem of assessment according to the impact criterion is a particularly interesting and still insufficiently researched field, which concerns the estimation of expected and realized effects in the project environment and generally the creation of long-term benefits for society. The proposed methodological approach is consistent with the needs concerning the assessment of public projects assessed in terms of their usefulness in meeting social and environmental needs and long-term impact analyzed in many aspects: socio-political, economic, cultural, technological and others. Project products in the form of research results and their scientific quality are of lesser importance compared to the expected benefits analyzed in a broader context. In the case of

praxeological analyses, the main attention is paid to the assessment of the effectiveness and efficiency of the processes of actions leading to the achievement of planned impact aspects.

It is therefore worthwhile to use the concept of the action system and praxeological analysis (which is one of the methods of goal-oriented explanation) in the process of building models supporting the assessment of the impact of scientific research, because it is necessary to track the effects of previously undertaken research initiatives, adapt subsequent ones to current social needs and strengthen public trust by ensuring the achievement of significant benefits of local, regional and even global significance.

This paper aims to outline how the systems approach and praxeology can be used in modeling the social impact assessment of scientific research. Using these approaches, elements of the system of activities and the relationships between them were identified, which allowed for the formulation of a general model of the assessment system, which can lead to a more detailed methodological analysis in the form of characteristics of information and decision-making processes. It also creates a basis for proposing an outline of directions for the development of methods for assessing the impact of scientific research. The obtained research results confirm that combining systems and praxeological approaches is useful for interdisciplinary modeling and improvement of goal-oriented systems. Such approaches enable good understanding and structuring of the assessment problem and reflect its complexity, multi-aspect nature, and are also open to extending the scope of classical praxeological and system considerations to computer systems operating in accordance with artificial intelligence algorithms.

2. Social Impact Assessment of Research

The quality of scientific research can be understood and measured in various ways, and only one of them is the evaluation of research in terms of creating new and useful knowledge that leads to the creation of innovative solutions and positive socio-economic effects. This type of understanding of quality is related to the attitudes adopted by scientists, who should be open to interdisciplinary cooperation and co-creation of scientific knowledge in innovation ecosystems (Haukipuro *et al.*, 2024).

Improving the quality of research can be supported by using indicators of innovation, productivity and, above all, impact (on society, the environment or a selected scientific discipline). Achieving satisfactory values of indicators, as well as high-quality scientific and socio-economic effects should be supported by the combined use of funding from public institutions and the business sector (Ou *et al.*, 2024). The broadly understood quality and excellence of scientific research should be assessed from the point of view of planned and achieved goals oriented towards new knowledge that is socially useful and that is the basis for building bridges between scientific results and their social impact on diverse groups of stakeholders, e.g. recipients and users of research, who may be individuals, groups of people or organisations experiencing the impact (Woolley and Molas-Gallart, 2023).

Difficulties in measuring the social effects of scientific research are particularly visible for scientific disciplines not related to the humanities and social sciences. Additional problems are generated by the lack of consensus on the accepted definition of social impact and uniform evaluation criteria. It is generally known that research impact concerns mainly socio-economic and environmental changes, which are of particular importance outside the academic environment, for diverse groups of stakeholders: those affected by the impact of research projects, political decision-makers developing strategies for financing and developing science, the economy, companies and selected areas of society (Dwivedi *et al.*, 2024).

Societal impact has a multi-faceted nature, which can be reflected in comprehensive qualitative research based on universal methodological approaches and expert opinions, which can sometimes raise doubts and suspicions of bias, as there are different views on the understanding of social impact, methods of its assessment and implemented directions for improving the strategy of developing scientific research aimed at achieving beneficial social effects, even in countries with great traditions and accumulated experience (Newman, 2024). The methods of assessing social impact are mainly peer reviews and surveys of expert opinion based on case studies, interviews, observation, mixed methods, bibliometrics, document analysis, assessment reports, alternative indicators and metrics, as well as advanced methods using data mining (Grzeszczyk, 2024). Methodological research is warranted into models that support universal (for different scientific disciplines), effective, and trustworthy assessment of the impact of scientific research.

The justification for undertaking research related to the use of integration threads in systems research is the need to provide methodological support for expert evaluators providing recommendations to support the

decision-making processes of decision-makers managing funds intended for financing research centers. The results of such evaluations have a significant impact on their position, prestige, and sometimes force the implementation of personnel policy and possible restructuring.

3. Integration Threads in Systems Research

General system theory is known and has been used for years in scientific research related to various scientific disciplines. The key concepts are: system, systems approach, systems science, systems thinking, systems research, system analysis, system research, system paradigm, system solution and system school. Analysis conducted within systems theory, based on the concept of an independent system or as a subsystem constituting an element of a larger whole, is particularly useful in research conducted within business and management studies. Organizations, individual research projects or sets of projects (programs) can be analyzed according to a simple input-output scheme - their functioning is explained by the transformation of input resources into results consistent with the adopted goals. Within an organization, various types of systems can be distinguished: socio-economic, information and knowledge.

The usefulness of systems research results from the ever-increasing complexity of the analyzed structures and the interdependence of objects related to socio-economic phenomena. Systems of increasingly complex structure consist of many objects that are interconnected and with the environment. The occurrence of uncertainty and ambiguity means the need to build models that integrate approaches that allow for the multi-aspect nature and uncertainty of the studied phenomena.

Integration threads in systems research can be an inspiration for modeling many aspects related to interdisciplinary general methodological considerations and the measurement of the impact of scientific research. In conducting these considerations, it may be useful to take into account the systems approach together, as well as sciences that can be considered systemic, i.e. business and management studies, praxeology and IT systems. The subject of research consistent with the systems theory is a system understood as a set of interconnected elements, each of which is connected to another element directly or indirectly to achieve a specific goal.

The systems approach is a broad concept and sets a paradigm indicating a rational model of procedure for solving complex and interdisciplinary problems concerning socio-economic-technical systems. In the case of such systems and related evaluation problems, accurate and precise data are relatively rarely available, and the analyzed issues are usually very complex, multi-faceted and require multicriteria investigation in conditions of uncertainty. Additionally, analyses related to solving the problem of assessing social impact usually concern considering, in addition to so-called hard problems, also so-called soft issues, e.g. social, environmental, etc. For these reasons, in the processes of modeling social impact assessment, it is necessary to pay attention to integrated approaches that allow for taking into account simultaneously aspects of soft systems and hard systems. Attention is drawn to the need to overcome the limitations of classical systems thinking and to introduce new science of systems, which is based rather on linguistic than mathematical modeling. In accordance with this new thinking, important places are occupied by informatic content, cognitive value and meeting the expectations of stakeholders (Korn, 2019). Another proposed direction of development is to combine static and dynamic aspects in problem-solving with paradigm change in systems thinking (Korn, 2025).

In system analysis, it is necessary to take into account the dynamic development of computational technologies and AI, which create opportunities to cope with the increasing amount of data that should be taken into account, related to, for example, social, economic and environmental aspects. Research should be undertaken on new directions of development of methodological systemic research within business and management studies, in which AI technologies are becoming increasingly important. In particular, such technologies play an increasing role in multicriteria decision-making processes based on intelligent systems, computational intelligence systems, AI systems and knowledge based systems.

4. Modeling Assumptions

The following assumptions were adopted for modeling the social impact of research:

- multi-aspect nature, i.e., taking into account quantitative and qualitative evaluation criteria,
- universality manifested by its usefulness for research from various fields and conducted at several stages (ex-ante, ongoing, ex-post),
- compliance with the requirements of research funding organizations,

- use of integrative features of the systemic approach,
- drawing attention to inspirations from praxeological evaluation criteria,
- openness to the application of ICT and AI technologies,
- primacy of learning over static use of knowledge resources,
- application of feedback and adaptive adjustment to changes in the environment, and ensuring permanent improvement of the evaluation,
- use a general form enabling the later creation of a formalized model – useful during its empirical verification.

The assumptions formulated in this way generally guide not only current but also future research related to creating a model in a form that can be empirically verified. The general model prepared within these theoretical studies provides the possibility of further implementing mathematical modeling, leading to the development of a form suitable for implementation, also using selected AI technologies.

The systems approach opens up possibilities of using the perspective integrating various, mutually complementary approaches, methods, techniques and tools. This approach allows to build a holistic general model with specified: input, output and feedback. In addition to feedback, adaptability can be realized using the situational approach, which together allow to take into account the variability of the system environment. The combined use of the principles of systems approach and the situational approach allows to reduce the limitations resulting from the too general nature of the system analysis and to increase the correctness of results determined in conditions of significant uncertainty, which is typical for real circumstances. Such combined use of the system approach, situational control, fuzzy logic and the main aspects of linguistics is useful when modeling advanced computational intelligence systems (Khayut *et al.*, 2016).

The introduction of an integrative perspective is also facilitated by the use of a praxeological approach, which is of great importance for conducting research related to research methodology for business and management studies, because it constitutes a bridge connecting theoretical philosophical considerations of a general nature with the theory and practice of management, which is characterized by a lower degree of generalization. Using the theory of praxeology, one can develop general principles of research methods and develop inquiries related to more practical methodological aspects.

The praxeological approach is particularly useful for modeling evaluation, i.e., investigating whether a specific action is efficient or inefficient. The usefulness of praxeology for building general models, e.g. for evaluating the social impact of scientific projects, results from its universal nature, as well as praxeological evaluation criteria (effectiveness, economicality and efficacy), which are useful in specific evaluation processes.

5. General Model of Assessing Social Impact

The construction of a general model for evaluating the social impact of scientific study is based on the methodological achievements related to systemic and praxeological approaches. According to these approaches, the identification and characterization of the elements of the assessment system is of key importance. Modeling this system should take into account the broadest possible context of the assessed research, which is facilitated by the general nature of the selected approaches. Assessing the impact of scientific research is usually a very complex and multi-faceted task, because research and development projects often involve significant financial resources, are characterized by a high level of technical and economic complexity, sometimes cause significant effects in time and space, and require taking into account many aspects not only directly but even indirectly related to their implementation.

Research projects and programs are very diverse, and increasingly related to strategies for dealing with serious social problems, permanent and irreversible changes in the natural environment, not only on a national scale, but sometimes even climate change on a global scale. This entails significant requirements for the constructed model and its adaptability, and the implementation of the adaptation processes of the methods and tools used to achieve its objectives and principles. Therefore, in the modelling processes, it is also necessary to take into account, among others, the evolution of the system's objectives and principles, as a result of the evolution of the turbulent and stormy environment. The adaptive development of the model can be considered as an expression of the progress of knowledge regarding the implementation of research and methods of impact assessment. The development and improvement of this model takes place through the use of feedback loops, the combined use of system approaches and praxeology, as well as ensuring openness to the use of new AI technologies.

For the modeling process, the concept of the action system and praxeological analysis, which is one of the types of goal-oriented explanation, are of key importance. The subject of the action is most often an expert performing the impact assessment, who functions within the elements of the assessment system, and among them we can mention: the purpose of the action (meeting the need to implement the assessment process), the subject of the action (research subject to assessment), tools and technologies (in accordance with the adopted methods of action), the resources of the action involved in the assessment process (mainly information resources, expert knowledge and their experience) and the environment of the action system (socio-economic and environmental conditions).

In the case of classical praxeological analyses, the subject of action is understood as an individual person or as a team of people. This subject implements the process of evaluating the project (subject of action) to achieve the objective, using resources and tools, and taking into account the conditions of the system's environment. In accordance with the praxeological approach, the evaluation of the efficiency of action, leading to the achievement of the intended objective, can be identified with a system of assessments covering many criteria typical of the praxeological evaluation process. Accepting the departure from the subject understood exclusively as an individual person is a certain departure from the classical praxeological understanding of the system of action.

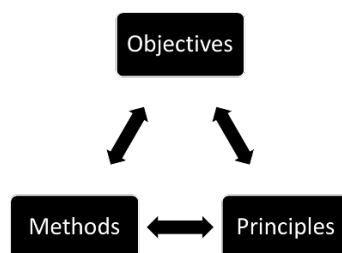


Figure 1: Basic elements of the general model (source: own study)

In the modeling process, it was assumed that the evaluation process is a praxeological system of action, within which three basic elements can be distinguished (objectives, principles, and methods), which is presented in Figure 1. Principles are specified by defining evaluation criteria. Strategic and current objectives achieved thanks to the introduction of the system (meeting the demands of its designer) should be consistent with the objectives and guidelines of public institutions financing research and a specific national system of guidelines and program documents referring to individual priorities, programs and financial instruments related to public interventions. These objectives should be specified in accordance with the applicable more general principles and more detailed evaluation criteria. In turn, the implementation and shaping of the main principles and information and decision-making processes of the system and the determination of its results can be served by socially-technical integrated methodological approaches and specific methods of impact assessment. Among these methods, an important place should be occupied by AI tools and techniques based on continuous learning, adaptation and improvement based on good practices and experiences gathered from previous evaluation processes carried out for different environmental conditions. The constructed model and its subsequent more detailed versions should ensure the implementation of a subsystem of methods that enable permanent improvement of the impact assessment of various studies.

6. Conclusions

The assessment of the social impact of scientific research is a complex and multifaceted problem. The use of a systems approach and praxeology made it possible to build a general model of the assessment system and create a basis for continuing research devoted to the development of new evaluation methods. The presented research results fill the research gap in the use of praxeological theory and the systemic approach for modeling the assessment of the social impact of scientific research. The theoretical considerations signaled now can be the basis for continuing more detailed analyses and empirical research. In particular, the proposed general model for assessing social impact can be a good basis for starting the modeling of information and decision-making processes using approaches consistent with the praxeological theory, R&D project management methodologies, information engineering and knowledge. The effects of this stage of modeling can then be used when constructing a formalized description of the assessment model, in which information and decision-making connections will be used. The use of information and knowledge engineering will make it possible to take into account the functions to be fulfilled by the assessment system and the necessary information and decision-

making processes that also reflect the dynamics of the evaluation decision-making system. The general model can also be the basis for developing a sequential-iterative model based on many repeated (in a feedback loop) sequences in order to implement the process of continuous improvement of the assessment.

The presented research is only preliminary in nature and it is worth checking the implementation possibilities of the proposed solutions and their empirical verification, especially in terms of their usefulness for supporting experts in taking into account qualitative features of difficult-to-measure determinants of praxiological efficaciousness, effectiveness, and efficiency. The terminology used in the case of assessing the social impact of research is ambiguous, which significantly complicates the assessment modeling processes. The approaches recalled in this paper have been known for a long time, but only the systemic approach has seen many practical applications. In the case of the second approach, there are relatively few practical solutions directly based on praxeological criteria, and they are rarely implemented in a direct form. The proposed solutions should be treated as an attempt to extend previously known models, but only the creation of specific formalized descriptions and attempts at empirical verification can help determine their usefulness. It is also possible to consider expanding the scope of research solutions inspired by various scientific trends derived from classical praxeology.

The conducted research is consistent with important trends in the development of methodological research related to impact assessment. There is a need to improve existing methods and models for assessing the social impact of study, but this is accompanied by significant challenges, primarily related to the considerable uncertainty of complex assessment processes, difficulties related to multi-faceted interdisciplinary research in R&D projects, the need to take into account difficult-to-measure quality criteria and problems with diverse stakeholder groups. The research results may also be useful for conducting impact assessments regarding research in the social sciences.

Ethics Declaration

Ethical clearance is not required for the research.

AI Declaration

OpenAI's ChatGPT 4.0 system was used to improve the clarity and readability of some expressions used in the text.

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Case Analysis of Improved Capstone Project Quality through a Course for Methods in Engineering Research

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Abstract: This paper highlights the impact of implementing a course about engineering research on the quality of capstone projects by master's students with limited science, technology, engineering, and math background. In the academic year 2020, the Naval Postgraduate School Systems Engineering Department began requiring students in the Systems Engineering Management for Acquisition program to take a course focused on engineering research. The graduation requirement for students in this program is a capstone team project and report. Prior to implementing an engineering course in the academic matrix, faculty assessments of the final reports identified shortcomings, specifically in the research approach, analysis, value proposition, and overall scholarship. The Department responded by developing a course in engineering research with an emphasis on applying engineering reasoning and critical thinking within the systems engineering design process. After the student's completion and submission of a final capstone report to the thesis processing office, faculty advisors provide a subjective assessment of the work. The evaluation criteria include the level that the students have demonstrated mastery of the discipline, rigorous application of research and analysis methods, critical thinking, and publication worthiness of the document. Using five years of data, the author conducted a comparative analysis of evaluations from project advisors before and after the course was required. The results of the analysis show significant improvements in the areas that were lacking in student work before the introduction of the engineering research course. Additionally, the author discusses specific elements of the course that indicate their contributions to improvements in the research approach and the overall quality of the work and final products. This case analysis asks the engineering community to consider elements of the engineering research course in future investigations or as a guide to develop a similar program of instruction.

Keywords: Engineering Research, Engineering Reasoning, Systems Engineering, System Design, Case Analysis

1. Background

It is acceptable to continue with convergent thinking and iterative processes that employ customary research methods as long as systems remain relatively simple. However, systems continue to grow in their dimensionality. The surge in technological advancements, greater depth of interactions between operators and the system of interest, as well as the exponential necessity for developing systems of systems to address increasingly complex issues demand novel approaches to augment conventional research and design practices. Engineering research, with an emphasis on combining engineering reasoning and systems engineering design, is a course that assists students to become better critical thinkers and solvers of complex engineering problems (Hernandez 2018). Before 2020, the Systems Engineering Department had no research methods course in any of its curriculum tracks.

A case analysis of students in the Systems Engineering Management for Acquisition (522) program at the Naval Postgraduate School (NPS) provides evidence of how a course in engineering research can improve students' capstone research efforts. Students in the 522 program have little engineering or mathematical background. Students in this program come from the U.S. Army Acquisition workforce that populates the program management offices for the development of Army systems. As such, approximately 22% of students have a degree in science, technology, engineering, and math (STEM). The rest of the 522 students have non-STEM degrees, with a majority having undergraduate degrees in business administration, political science, and criminal justice (Hernandez 2020).

Senior leaders in Army Acquisition have made it imperative for the workforce to have the acumen and technical vocabulary to discuss engineering matters with the contractors and manufacturers with which they must negotiate. The recent past has shown headlines of different cases of systems engineering failures that can be traced to poor practices that program offices should have identified (Schwartz 2024). Loss of life, equipment, time, and resources justify the move toward educating the work force in engineering fundamentals and their linkages to program management. Systems Engineering Management is the discipline of managing the activities, personnel, and resources of many types of engineering fields to create a new system. Overall, 522 students have limited experience in the processes of scientific inquiry. These conditions tend to negatively affect student projects. The final products lack elements of scholarship that faculty members and the engineering community demand. The Systems Engineering Department responded by developing and requiring 522 students to take the course, *Methods in Engineering Research*, which is referenced as SE3077 for the remainder of this paper.

1.1 Engineering Research

Engineering research follows the norms of scientific discovery. This paper does not claim that engineering research is more rigorous than scientific research. In fact, the success of engineering research is based on the meticulous nature of the scientific process embedded in general research. The distinction in engineering research is that new knowledge serves the primary purpose of developing functional design solutions to an engineering problem, whereas general research can be performed with discovery as an end in itself (Creswell and Creswell 2018). Another important difference between engineering and general research is time. Engineering research requires an engineering solution in a finite amount of time while general research may not necessarily have a definitive deadline.

Research within the engineering community is decidedly quantitative with good reason. Evidence based decisions are critical to system design solutions. Experimentation and numerical analysis are primary methods (Nagabhushan 2016). Generally, a research plan will combine several approaches that center on numeric techniques (Thiel 2014). However, as systems increase in complexity, the greater the need for different methods, including qualitative and multimethod approaches (Johnson and Hernandez 2016). Engineering accepts the need for diverse techniques with an end state of solving the engineering problem.

The engineering problem is based on three elements: design knowledge – K, design specifications – S, and design variables – V (Summers 2005). Engineering research is a systematic exploration of these elements during the Systems Engineering design process. The language that engineers use is based on rational thinking (Paul, Niewoehner, and Elder 2013). Charles Peirce distinguished three classes of reasoning: deductive, inductive, and abductive (Nozawa, 2008). Engineering thinking during research is a deliberate effort to apply the appropriate logic type to examine an engineering element in any phase of the design. Whitcomb and Hernandez (2017) summarize each type of logic in terms of V, K, and S (Table 1).

Table 1: The types of engineering reasoning can be distinguished by the known design elements and that which must be derived in the engineering problem (Whitcomb and Hernandez 2017).

Logic	Given	Derived
Deductive	V, K	S
Inductive	V, S	K
Abductive	K, S	V

The objective for applying a specific type of engineering logic is to obtain the missing design element in the relevant stage of the design process. For instance, deductive thinking focuses on the study of design variables and the design team's current knowledge to develop design specifications. Similarly, inductive and abductive reasoning surface in other phases of engineering design. The aim of tying engineering logic with systems engineering design is to assist students in training their thinking during an often complex, iterative process which is discussed in the following section and summarized in Table 2. A formal course to teach the connection between engineering research and engineering logic can be valuable to the engineer's design approach. This paper explains how such a course has improved the research efforts of 522 students.

1.2 Engineering Logic

Engineers do not have all the relevant information at the beginning of the design process. Research is necessary to fill the gaps in the known data (Paul, Niewoehner, and Elder 2013). Peircean Science of Inquiry eventually evolves into the scientific method and subsequently helps frame engineering research (Nozawa 2008). The following explains the different types of reasoning and their cumulative application.

1.2.1 Overview of Deductive, Inductive, and Abductive Thinking

Deductive reasoning applies when the design variables and design knowledge about the engineering problem are known. This is usually the case at the beginning of the design process. As a simple engineering example, consider the need for a beverage container. Design variables can include the amount of liquid that the container holds, weight of the container itself, or the frequency that it will be used. Knowledge about the problem consists of the density of liquids and the properties of potential material for the container. Other information about the engineering problem includes rules about the relationship between the strength of the material and its ability to hold the weight and density of a particular liquid. Given these design elements, deductive reasoning

analytically determines the specifications of the container. The designer would make conclusions (specifications) about the maximum size of the container, the minimum amount of liquid it should hold, its durability, or the amount of fatigue (weakening of material) incurred for a given applied load. These can measure the suitability of the design.

Inductive reasoning is a process to derive design knowledge. Knowledge is a set of facts about the system or similar systems, and the system designer's level of experience and study about the system. During the design process, it may happen that the accumulated knowledge about the system is insufficient to continue with its design. This situation prompts the design team to obtain additional information through inductive thinking. At this point, the engineer would have a set of design variables and design specifications. However, the information about causal relationships between variables or even the concept of operations for the system may be vague. Experimentation is a natural technique in inductive thinking. Test runs keep certain design variables constant while changing the values of other variables and measuring the impact on the design specifications. Analysis develops a mathematical expression for the relationship. Continuing with the beverage container example, the engineer would hold the amount of fluid constant, vary the container material, and subsequently measure the fatigue that the container sustains during the experiment. The resulting relationship between material properties and fatigue informs the engineering problem.

When design knowledge and specifications are given, abductive thinking aims to discover new design variables, or to re-examine design variables that the engineer had previously considered as unimportant to the problem. Again, referencing the beverage container example suggests how abductive thinking could take place. Material properties of the container have been established as an important factor to the container's level of fatigue. However, it is not certain that only the material properties contribute to the fatigue that the container may exhibit. For instance, the conditions of the experiment may involve other factors such as the temperature of the liquid, the air temperature surrounding the container, or the speed at which the liquid enters. Examination of these new factors in an experiment may prove significant to the level of fatigue that occurs. In this example, not only does this approach identify new design variables (temperature, speed), but it also alters the context for using the container—system knowledge.

1.2.1 *Retroduction, an Iterative Application of Logic – the Retroductive Design Process*

Retroduction is not a class of logic. It is a process that applies the different types of engineering reasoning in conjunction with the iterative cycle of engineering design. Retroduction is deliberately cyclic. Table 2 is just one instantiation and depends on the step in the design process that the engineer is addressing. Within the table, the cycle is linearized to associate it with the engineering design process (Summers, 2005). The last column of Table 2 indicates potential research methods that can be applied.

Table 2: Implementing the retroductive process into the engineering design process (Summers, 2005).

Step	Situation for Applying Logic	Retroductive Design Process
1	An unexplained fact is observed	Design specifications are provided.
2	An exploration of the relationships with the fact(s) is made	Assimilation of the design specifications, including trying to determine secondary constraints and the relationships (explicit and implicit) between requirements, constraints, and goals.
3	Abductive reasoning is applied to posit an explanation for the observation (via selective or creative hypothesis formation)	Abductive reasoning is used to generate possible design solutions. These solutions may be generated either through routine or novel strategies.
4	Deductive reasoning is applied to prepare the explanation for testing	Deductive reasoning is used to formulate an analysis of the posed solution(s), which may include identifying additional design variables that are part of concern along with the known relationships between them and the specifications.
5	Inductive reasoning is applied to test and evaluate the guess	Induction is used to compare the original design specifications against the values for the specifications based upon the analysis of the design solution. Induction is used to determine possible correlations of the deficiencies between the desired and calculated. These correlations are accepted into the design knowledge as new knowledge.

Step	Situation for Applying Logic	Retroductive Design Process
6	Abduction or deduction is used to interpret the evaluation and the cycle begins	Abduction may be used to propose new hypotheses for why the deficiencies exist or deduction may use known knowledge for reasoning about the deficiencies. Based upon the hypotheses (abduction) or the conclusions (deduction) changes are made to the original hypotheses (design solutions) through abduction. The cycle repeats.

2. Course Development – Combining Engineering Research and Engineering Logic

Engineering logic and engineering research are the foundations for developing SE3077 (Hernandez 2018). The course is intended to prepare engineers on how to investigate complex engineering problems. Incorporating engineering reasoning within the systems engineering design process provides context and motivation for engineering students to pursue different methods of inquiry for an engineering solution.

Central to the course is an actual topic and problem that each student or student team must resolve for a primary stakeholder. The instructor uses the engineering problem to show how course concepts and techniques manifest themselves, and to which engineering students can relate. The interaction between the student, stakeholder, and advisory team creates a realistic environment that adds a dimension for selecting a research design and communicating, as well as negotiating on the road to a problem solution.

2.1 Course Textbook and Study Material

Selection of course textbooks considered student unfamiliarity with formal research and lack of understanding the importance of research in engineering sciences. For SE3077, the course textbooks include *Research Methods for Engineers* (Thiel 2016), *Research Design* (Creswell and Creswell 2018), and *The Thinker's Guide to Engineering Reasoning* (Paul, Niewohner, and Elder 2013).

The course provides additional information that expands the students' horizons about research methods. The material is meant to educate the students on the versatility of systems engineering and other techniques and the ability to integrate them to investigate difficult problems. The instructor selects articles that are relevant to course objectives. Invited lecturers are expert practitioners of specific methods of inquiry who present recent examples of their work. Discussions from these interactions go beyond textbook readings.

2.2 Overview of Course Modules

The course is an eleven-week program of instruction that consists of three major sections and thirty-three contact hours. The course includes fieldwork where students engage their advisory team and stakeholders. Means of evaluation are scheduled in major milestones in the instruction and will be discussed in the following section.

Part I (weeks 1 – 5) is an introduction to basic research techniques, engineering research, and the design process. Material from Wasson (2016), Blanchard and Fabrycky (2011), and Dym and Little (2000) provide basic systems engineering techniques. Discussion begins by defining course objectives, learning outcomes of the lessons. It reviews the systems engineering design process. A study of traditional research methods provides the student with basic techniques (Creswell and Creswell 2018). An important aspect of instruction includes problem definition and the literature review. This section of the course ends with a midterm examination.

Part II (weeks 6 – 8) involves the different classes of logic and retroductive thinking and their application in the system design process (Summers 2005). A short history on engineering reason and logic begins this section of the program (Paul, Niewohner, and Elder 2013; Nozawa 2008). Study modules for abductive, inductive, and deductive thinking are the primary focus in this part of the course. A discussion of the retroductive process shows the iterative application of the major classes of engineering logic. The discussion links design and engineering reasoning in terms of engineering elements.

Part III (weeks 9 – 11) consists of lessons for developing a research plan and proposal, post-research activities to include publishing scholarly articles, as well as thesis and report writing. Final course modules contain advanced discussion of quantitative and qualitative research techniques that follow steps in the design process, corresponding tasks or objectives of each design step, and the class of engineering reasoning that governs how to address the tasks. The students combine lessons and all past work to develop a research proposal.

2.3 Evaluating Achievement of Course Objectives

Grades are based on the students' demonstrated knowledge and facility with topics and concepts in the course. There are three graded assignments and a midterm exam in the course. There is no final exam. Grades are awarded in accordance to thresholds from the "Evaluating Student Work in Engineering" section of *The Thinker's Guide to Engineering Reasoning* (Paul, Niewoehner, and Elder 2013). The following discussion provides details about course work that helps the instructor assess student achievement of learning outcomes and objectives.

Textbook exercises reinforce daily lessons and key concepts in the course. They are the foundation for addressing graded requirements, midterm examination, and discussing assigned articles. Students attempt homework exercises prior to class. Unclear topics good discussion points during the class session. Students are encouraged to revisit the homework after class to ensure that they have a clear understanding of the concepts.

Assignment 1. Problem statement and summary development is a graded assignment. Research begins with clearly understanding a given problem. A researcher must be able to define the problem for which a research effort is applied. Each student will use information from their capstone or individual thesis topic and any material that their primary stakeholder and/or advisor has provided. The Ishikawa or Fishbone Diagram (Ishikawa 1974), initial readings or documents about the topic area, and their own critical thinking, enable each student to independently develop a 2-page problem statement and summary.

Assignment 2. The literature review is a cornerstone for research and will span the majority of the class (Creswell and Creswell 2018). Based on the topic and engineering problem statement and summary, students collaborate with their advisory team and primary project stakeholders to learn more about appropriate documents, articles, and other references to study the problem. For the purposes of the course, students will use up to thirty different sources for the literature review. Part one of the literature review begins with five to ten sources.

Midterm Examination. At the end of Week 6, students take an online midterm examination to demonstrate their understanding of the topics discussed from Weeks 1 – 6. The exam is a timed, individual effort, consisting of a range and different forms of questions that total 100 points. It is an open book examination. Use of the internet is strictly prohibited except access to the online exam.

Assignment 3. The final graded assignment for the course is a draft capstone or thesis proposal. The proposal is an end-of-course deliverable. Each capstone team develops a written proposal that incorporates ideas from engineering reasoning and the engineering design process. Teams work with their respective advisory team and stakeholders for this assignment. Days for fieldwork are part of the course agenda.

3. Advisor Team Scoring of Capstone Projects

The primary objective of SE3077 is to impart the necessary knowledge that will help the students in their future endeavors and improve their research efforts (Hernandez 2018). The aggregate effort in which the effectiveness of SE3077 can be measured is the capstone project and final report. The capstone faculty advisory team assesses the final report in terms of the following criteria (Table 3):

Table 3: Faculty advisors use these criteria to assess the capstone report (NPS Thesis Processing Office 2025).

Criteria	Criteria Definition (Scored on a scale of 1 – highly disagree, to 5 – highly agree)
1. Subject Matter Competence	Student(s) demonstrate graduate-level knowledge and competencies in the/their academic field.
2. Methods and Technical Merit	Student(s) demonstrate the ability to apply technical expertise and appropriate methodological rigor in conducting research and analysis.
3. Critical Thinking	Student(s) demonstrates the ability to apply critical thinking and logical reasoning to research questions and to implement creative or innovative approaches to answer them.
4. Written Communication	Student(s) demonstrate proficiency in communicating and presenting the written results of the/their inquiry in a thesis or final project report appropriate to the/their academic program.
5. Oral Communication	Student(s) demonstrate proficiency in communicating and presenting the results of the/their inquiry in a thesis or final project report in an oral presentation. (Note: this

Criteria	Criteria Definition (Scored on a scale of 1 – highly disagree, to 5 – highly agree)
	dimension is optional – complete if it applies to your curriculum or department.)
6. Defense Relevance	The thesis or final project addresses a problem of relevance in the defense or national security community.
7. Relevance to Curriculum	The thesis or final project is closely aligned with the student's assigned curriculum.
8. Potential for Publication	Whether the content of the thesis/final project approaches standards for academic or practitioner publications.

The most relevant of these evaluation areas, and that which concerned faculty before the introduction of SE3077, were criteria 1, 2, 3, 4 and 8. Criteria 5, 6, and 7 are highly dependent on the problems that are being sponsored and therefore beyond the students' control. They are not part of this case analysis. It may be argued that the results of criteria 1 through 4 would determine whether the resultant report was publishable. However, for this study, it is important to discuss how specific elements of SE3077 map onto these criteria.

4. Analysis of Advisor Scoring of Capstone Project Reports

The focus of this study is on students in the 522 program in the Systems Engineering Department.

4.1 Data Analysis

The 522 program began in the summer quarter of academic year 2018 with one cohort of 30 students that graduated in academic year 2020. Inclusion of SE3077 in the 522 academic matrix began after graduation of the first cohort. Capstone teams consist of four to six students. The assessment data are from 35 capstone research efforts involving nearly 180 students. Each project report is evaluated by each member of the associated advisory team which can number from two or three faculty members. The element of analysis is the evaluation score from each advisory team member. The Likert scores are treated numerically (Norman 2010). The number of evaluations of reports that were produced by students who had not taken SE3077 was 15. The number of evaluations of reports from students who had SE3077 in their academic program was 71. The following summary data shows the average scores for criteria 1, 2, 3, 4, and 8 prior to and after inclusion of SE3077 in the 522 academic matrix (Table 4).

Table 4: Summary data of evaluation scores before and after inclusion of SE3077 in the 522 academic matrix.

	1. Subject Matter Competence	2. Methods and Technical Merit	3. Critical Thinking	4. Written Communication	8. Potential for Publication	Sample Size
Before SE3077						
Average Score	3.60	3.60	3.67	3.20	3.40	15
Standard Dev.	1.06	0.99	0.98	1.15	0.99	
After SE3077						
Average Score	4.03	4.06	4.15	4.08	3.79	71
Standard Dev.	0.86	0.88	0.86	0.89	1.11	

Visual comparison of the data indicates that scores in the assessment areas are higher after inclusion of SE3077. The author analyzed these results using a one-sided t-test with a significance level of 0.10 and assuming unequal variances (Montgomery and Runger 2014). However, because the sample sizes are drastically different, the author used Welch's t-test, a variation of the traditional t-test (Hogg and Tanis 1997).

For each t-test, the null hypothesis is that the difference between the average scores is zero. The alternative hypothesis is that after inclusion of SE3077 the average score is higher. The results show that the differences between each pair (before and after) of averages are statistically significant. This empirical analysis of the data provides evidence that SE3077 is a factor in improving capstone research efforts.

4.2 Interpretation of Results and Trace to SE3077

The analytic evidence to show SE3077's value for improving student research is accompanied with a discussion of relevant course elements with the assessment criteria. Table 5 briefly explains the linkages.

Table 5: Tracing capstone assessment criteria to SE3077 objectives and elements.

Criteria	SE3077 Features
1. Subject Matter Competence	Emphasis on the engineering design methodology as part of the research effort requires students to have an overall deeper understanding of the engineering process and associated techniques.
2. Methods and Technical Merit	Focus on different basic research methods and relationship with the design process creates greater awareness of the methods and their deliberate application to derive information about a given element of the engineering problem.
3. Critical Thinking	Explanation of different types of logic and their iterative use in the design process expands the student's ability to determine the type of logic that is needed in the design step and an appropriate research method to use to find an engineering solution.
4. Written Communication	Assignments throughout the course include writing a problem statement, problem summary, a 20-page literature review, and a complete capstone proposal. Each project is graded on content, writing style, mechanics, and adherence to format requirements.
8. Potential for Publication	The combination of competence, research methodology and analysis, which translate to critical thinking, as well as writing exercises sum to greater student abilities to formulate, examine, solve, and document research. From the author's perspective, this is the quantum measure for SE3077's effectiveness.

5. Conclusions and Recommendations

Implementing a course about engineering research has proven to be an effective approach to improve the quality of capstone projects by engineering master's students with little STEM background or experience with formal research. Faculty assessments of capstone reports revealed weaknesses in the student's ability to properly apply the scientific method and analysis in their work. As a remedy, the academic department created SE3077, a course based on engineering research and engineering reasoning.

Features of SE3077 were specifically developed to address identified shortfalls in student products. The course revisited the engineering design methodology that is fundamental to the systems engineering program. Entwining research methods in the design process provided context for students to recognize the importance of research techniques and focus on specific engineering methods. The result was greater competence in the systems engineering discipline. Introducing basic and advanced research methods was a primary objective in SE3077. However, linking these methods in the deliberate application of a specific type of logic to derive information about an engineering element in the problem was a key objective. This combination increased the students' use of research techniques and critical thinking skills. Each was rigorously evaluated in the course. The aggregate measure of effectiveness of the course was the publication worthiness of the capstone report.

Five years of evaluation data from advisory team members was collected to compare capstone products from students after inclusion of SE3077 in the program of instruction with products before SE3077 was introduced. Analysis of the data showed that the improvements of products after SE3077 was added were statistically significant. In all five of the most relevant criteria, assessment scores increased.

The discussion in this paper argues for immersing engineering students to engineering research and engineering reasoning to equip them with skills to solve complex problems. The major features of SE3077 are specifically designed to increase problem solving abilities, logical implementation of research techniques in alignment with the engineering design process, and scholarly writing. The author offers SE3077 to the engineering community as a foundation for future scientific inquiry or as a guide to develop a similar program of instruction in engineering departments or short courses in commercial organizations.

Ethical Declaration

I declare that this manuscript is original work and has not been published elsewhere.

AI Declaration

I have not used any AI tools or technologies to prepare this manuscript.

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A Method for Selecting Sociotechnical Theories in Information Systems Research

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Abstract: Information systems (IS) researchers are progressively employing sociotechnical theories to underpin, particularly, qualitative studies. Subsequently, work has been conducted on how to apply the theories. Despite the increasing popularity and academic efforts, challenges persist, which sometimes hamper the research sequence. This study focuses on the seven commonly applied theories in IS research, which are activity theory (AT), actor-network theory (ANT), contingency theory (CT), diffusion of innovation (DOI), grounded theory (GT), structuration theory (ST), and technology acceptance model (TAM). Based on the comprehension of the theories, the study proposes a three-step approach to ease the selection of sociotechnical theories for IS research. This includes the complementarity of the theories in research. Additionally, it highlights the vocabulary used within the theories, which contributes to the confusion and challenges encountered by researchers, particularly emerging researchers and postgraduate students. The three-step approach increases rigour in qualitative research and advances the application of sociotechnical theories in IS research.

Keywords: Sociotechnical Theories, Activity Theory, Actor-Network Theory, Contingency Theory, Diffusion of Innovation, Grounded Theory, Structuration Theory, and Technology Acceptance Model.

1. Introduction

Humans create or employ information technology (IT) and information systems (IS) solutions, and they function together as a system. As the system operates, relationships are formed and interactions occur, making it complex. To gain meaning in the processes and activities beyond the conventional interpretivist approach, sociotechnical theories are applied. Primarily, sociotechnical theory provides interconnectedness between human actions and technological capabilities, which is holistic. Tsang and Ellsaesser (2011) deduced that theories are essentially employed to facilitate knowledge in the process of extracting findings. In the process, it adds rigour in producing formidable scholarly contributions.

Applying the theories can be viewed from three standpoints: behaviourist, cognitive constructivist, and social constructivist (Gregor, 2006). Explicitly, Iyamu (2024) states that applying sociotechnical theories in IS research guides and helps to give meaning to humans' experiences, feelings, thoughts, and knowledge, including explaining what, when, why, and how factors influence actors or agents in the phenomenon being studied.

Due to its growing popularity and importance, Mkhomazi and Iyamu (2013) focused on the importance of selecting appropriate theories and how they could provide a systematic method in data analysis in IS studies. This was enhanced by Iyamu (2021; 2024), which attempted to provide a guide for the use of six theories in IS research. Despite the efforts and attempts by these and other authors, challenges remain, and it is increasingly affecting some researchers in IS in selecting theories to underpin their studies. The sociotechnical theories by themselves are a challenge as they do not have a formula, and it is not guided by distinct views and boundaries (Lawrence, 2010). Iyamu (2024) responded by explaining that researchers often have different opinions and interpretations, which should be guided using a formulaic approach.

The challenges are influenced by various factors. Mkhomazi and Iyamu (2013) suggested that the challenges are either because the theories are not of the IS field or some aspects of the theories could be seen to overlap. Sawyer and Jarrahi (2014) argued that selecting theories to underpin IS studies remains challenging. Osanloo and Grant (2016) attribute the challenges to the articulation of the rationale for selecting theories. Sekgweleo et al. (2017) suggest that the influencing factors are not understood.

Some of the challenges remain because it is difficult to find literature that provides procedural steps and attributes that constitute selecting the most appropriate sociotechnical theories in IS research. This study upholds this as a gap and proposes a solution. Thus, the study poses a question: What are the steps and attributes that aid the selection of sociotechnical theories in IS research? In answering the question, a literature review was conducted to scholarly affirm the gap and challenges in selecting sociotechnical theories to underpin IS research. The literature focuses on the most applied theories IS field. Sekgweleo et al. (2017) argued that

activity theory (AT), actor-network theory (ANT), contingency theory (CT), diffusion of innovation (DOI), Structuration Theory (ST), and technology acceptance model (TAM) are the most used theories applied in the IS field.

The paper is organised into five main sections. In the second section, the study is problematised. A literature review is presented in the section that follows. It includes a summarisation of the concepts and vocabulary of the sociotechnical theories. In the fourth section, a three-step approach that can be used in selecting sociotechnical theories in IS research is proposed. The conclusion is summarised in the last section.

2. Problematising Sociotechnical Theories in IS Research

Theories consist of the ideas, concepts and principles that are organised and related to describe and explain a particular phenomenon (Yahaya et al., 2019). These ideas and concepts are logically arranged in a conceptual framework to display how they are related in a research study (Mensah et al., 2020). The theories developed from tested and published knowledge are summarised and integrated to form theoretical frameworks. Kivunja (2018) explains that theories are theoretical frameworks that provide lenses that help to provide a structure on how to examine, analyse data and interpret findings. Theories provide explanations of how things work based on evidence. Hence, the theoretical frameworks help to simplify and make sense of complex phenomena (Jones & Abes, 2011).

Theories are broad, comprehensive and difficult to put into practice (Cairney, 2012). For a researcher to use a theory, the researcher needs to understand the vocabulary of the theory, its weaknesses and strengths, including its previous use (Holmström, 2005). Without such understanding, applying a theory becomes a challenge. However, Sekgweleo et al. (2017) state that the selection and application of a theory do not solely depend on the knowledge and understanding of the researcher. The research problem and the aim of the study also contribute to the selection and application of an appropriate theory.

Fundamentally, sociotechnical theories contribute to IS research in four ways, primarily, by helping to: (1) associate meanings with what is experienced, observed, and felt; (2) guide explanation of relationships that exist between entities within context (social system and activity systems, and environment); (3) provide propositions and link influencing factors and attributes including their effects; and (4) intended to improve our understanding of computing as they apply to the world. Also, using a theory in research enhances the robustness and rigour of the findings of the study (Stewart & Klein, 2016). Thus, IS field increasingly relies on the use of these theoretical frameworks borrowed from other disciplines (Lynch et al, 2020). Because of that, the adaptation and use of theories in IS studies become difficult and controversial (Rose et al., 2005).

3. Sociotechnical Theories in IS Research

From the literature, over thirty sociotechnical theories exist and have been applied in IS studies (Wu et al., 2022; Hanafizadeh et al., 2020). This study focuses on the sociotechnical theories most applied in IS studies. According to Iyamu (2021), seven sociotechnical theories have been applied in IS research over 50,000 times in peer-reviewed materials in the last two decades. These are AT, ANT, CT, DOI, GT, ST, and TAM.

Activity theory provides a socio-cultural and socio-historical lens through which human activity can be analysed. The theory focuses on the hierarchical structure of the activity, which is made up of activity, action, and operation (Kaptelinin & Nardi, 1997). A central concept of AT is the consciousness of the subject when carrying out activities. Schmidt (2022) noted that in AT, activity and consciousness are dynamically and inextricably interrelated. Consciousness is the enactment of our capacity for attention, intention, memory, learning, reasoning, speech, reflection and imagination (Kaptelinin & Nardi, 2006, p.6). Congruently, Engeström and Sannino (2021) assert that activity systems are increasingly interconnected and interdependent. According to Kaptelinin and Nardi (1997), in IS, AT provides a conceptual framework for describing the structure, development, and context of computer-supported activities.

Actor-network theory is concerned with the creation and maintenance of networks consisting of human and non-human actors. In ANT, an actor can be anything human and non-human, provided it is granted to be the source of an action and can make a difference (Latour, 1997). ANT does not deploy any distinction between human and non-human agents; rather, they are treated equally in building networks. Also, actors and networks are inseparable. Bueger and Stockbruegger (2017) explain that agency is realised through networks and in association with other actants. Also, a network can be part of other networks, resulting in actors and network heterogeneity (Iyamu, 2021). Translation is another important tenet of ANT. It focuses on the transformation of

activity from one stage to another (Callon, 1986) and the negotiation of meaning within a network (Iyamu, 2021). These aspects of ANT described here are critical and help to deduce certain manifestations in the development, implementation, and practice of governance of IT solutions.

Contingency theory is concerned with fit and that there is no best way (Betts, 2003). The theory is entrenched in studying organisations' behaviours, which manifest from how contingent factors such as technology, culture, and the external environment are designed to function (Islam & Hu, 2012). In CT, each organisational structure is unique to its environment and, therefore, cannot be applied to another organisation (Petrovska & Berzins, 2020). "The effectiveness and operation of each organisation are purely dependent on the fit and match of the variables such as technology, environmental volatility, the size of the organisation, features of the organisation structure and its information systems" (Islam & Hu, 2012, p.5159). Thus, the theory is suitable for analysing subsystems such as IS/IT solutions, including how they are developed and implemented. Petrovska and Berzins (2020) suggest that examining subsystems helps to respond to and improve organisational situations that arise within its environment.

Grounded theory focuses on generating a theory that is grounded in data, which is shaped by the views of the participants (Turner & Astin, 2021). Miner (2015) describes GT as a theory that focuses on qualitative research that aims to develop a systematic, limited-domain theory about observed phenomena. Turner and Astin (2021) assert that GT is both a methodology and a method used in qualitative studies. As a methodology, GT provides a process for the emergent discovery of conceptual theory from empirical data (Holton, 2009). As a method, GT provides a systematic method that shapes the data to be collected and provides strategies for analysing it (Charmaz & Thornberg, 2021).

The theory allows the researcher to interact with the collected data and analyse the data to determine additional data to be collected for a deep understanding of the phenomenon. Charmaz and Thornberg (2021) explain that with GT, the data focus emerges during the research process rather than being determined before the inquiry begins. Thus, the research focus keeps evolving as the researcher understands what is important to the participants from the data collection and analysis process (Turner & Astin, 2021). GT is applied in information systems research to guide the development of theories about the application of technologies in organisations. According to Holton (2009), GT studies are not conducted to test hypotheses but to generate theories that directly capture and explain processes, actions or interactions involving real-life social phenomena.

Diffusion of innovation aims to understand how people decide to adopt or not adopt an innovation. Innovation is something which is regarded to be new by potential adopters (Dearing & Cox, 2018; Kaminski, 2011). In DoI, the adoption of each innovation is influenced by five characteristics: relative advantages, complexity, compatibility, observability, and trialability and emphasis on the criticality of communication channels and time, in diffusing innovation within a social system (Rogers, 2003). Call and Herber (2022) asserted that DoI theory is applied in information systems to understand why some technological innovations gain rapid, widespread acceptance while others with comparable advantages take much longer or will never be adopted at all.

Structuration theory focuses on social systems, within which the theory keenly magnifies structure, agency, and reproduction (Giddens, 1984). Social systems represent the recurrent, empirically observable, and situated doings of human actors (Englund et al., 2020). In ST, agents represent both technical and non-technical artefacts, and structures are the rules and resources (Iyamu, 2021). Larsson (2012) explains that agents act within a structure that simultaneously constrains and enables their activities, the structure itself is dependent on the human activity that it governs. These are key factors that influence the development, implementation, or practice of IS solutions. Thus, from these perspectives of structure, constraints, and enablement including an understanding of the roles of agency and reproduction, many IS researchers are lured to select the theory.

The technology acceptance model focuses on the perception, predicting, and explaining acceptance of IT/IS solutions by their users in organisations (Aburbeian et al., 2022; Davis, 1989). TAM provides a useful analytic framework for the use and adoption of technology through the variables of perceived usefulness, perceived ease of use, and use intention (Han & Sa, 2022, p. 405). Davis (1989) explains that a user's attitude towards the system is a major determinant of whether the user will use or reject the system. In TAM, the user's attitude towards the system is influenced by two constructs: perceived usefulness and perceived ease of use. Davis (1989, p. 320) defines "perceived usefulness as the degree to which a person believes that using a particular system would enhance his or her job performance, whereas perceived ease of use refers to the degree to which a person believes that using a particular system would be free of effort".

4. Selecting the Most Appropriate Theory

The guide for selecting the most appropriate theory is a three-step approach. Step number one is to identify the attributes of the objective or phenomenon being studied. In the second step, an understanding of each theory's capability (the strengths and weaknesses) is gained. The first (attributes of the research objectives) and second (strengths and weaknesses of the theories) steps are mapped, and weights are associated with the mapping to determine the most appropriate theory in the third step.

4.1 Step # 1: Research Objective Attributes

A research objective is a statement or statements that provide specific and realistic goals that the study intends to achieve (Nayak & Singh, 2021). The statements are derived from the research aim, which is a broad statement that captures the main purpose of conducting the study (Thomas & Hodges, 2010). According to Khoo (2012), research objectives should be concise and achievable within the set timeline. Research objectives help to guide the development of the entire study (Farrugia et al., 2010). Hence, Monrroy et al. (2022) state that research objectives need to be aligned with the research title and problem. Research objectives consist of attributes, which are the verbs and nouns within the research statements. For this study, the attributes (the factors that constitute) of the IS theories are identified in Table 1.

Table 1: Theory focuses and attributes

Element	Description
Technology (Artefacts)	An artefact is a man-made object with a specific purpose, consisting of a make plan, a use plan and a capacity specification (Weigand et al., 2020). An artefact is a tool that is passive and governed by people. The artefacts influence the implementation, management and government of IT solutions (Mutasa & Iyamu, 2023). Artefacts can be technical and non-technical.
Interaction	An interaction is a transaction between two or more entities towards fulfilling a task or achieving an objective within an environment. The interaction between entities is shaped by the relationships that exist between humans, technology and processes (Hornbaek & Oulasvirta, 2017). Iyamu (2019) identifies different interactions such as human-to-human, human-to-process, human-to-technology, process-to-process, process-to-technology, and technology-to-technology.
Interconnection	Interconnection is defined as a connection between two or more components or people that influence or affect one another. The components include people, technology and processes. During the interconnections, the components are dependent on each other. Hence, it is crucial to identify all the required components and their role towards achieving the objectives of the study. In that way, it allows the recognition of the influence of each component that has on a system (Iyamu, 2021).
Negotiation	The development of IT solutions requires a process of negotiation between actors (Iyamu, 2021). The negotiation entails an in-depth interaction of the actors, which results in the negotiations being shifted towards determining a common goal.
Relationship	A relationship is constituted by connection, communication and collaboration. Relationship constitutes the power to influence and control entities, and enact planning and decision-making processes (Beritelli, & Laesser, 2011). Also, relationship influences the allocation of tasks, roles, and responsibilities (Iyamu, 2017). The relationships formed based on power are shaped by organisational rules and regulations.
Rules	Rules are a set of policies and regulations that govern actors in the activities they perform (Dennehy & Conboy, 2017) over a period and within a specific environment. According to (Tessier & Zahedi, 2022), rules help to define processes that need to be followed and manage relationships and interactions between actors (Wang et al., 2020).
Structure	In IS theories, structure refers to rules and resources which help shape a social system (Giddens, 1979). Humans need rules and resources to be able to achieve an activity at hand (McPhee & Canary, 2016). Structure refers to the organisations and relationships of components in a computing environment. It depicts the power and flow of information in an organisation.

4.2 Step #2: The Theories' Capabilities

Every theory has a focus, which represents features that uniquely set it apart from other theories. Based on the focus, each theory inherently has weaknesses. Reinking (2012) shared that each theory has some inherent weakness that needs to be considered before its application. According to Iyamu (2024), from the perspective of naturalism and realism, disadvantages come with every theory's advantages. Thus, the theory's strengths and weaknesses are simultaneous, as one cannot exist without the other. On the other hand, a researcher often supplements a theory's weakness by selecting a second theory. Nehemia and Iyamu (2023) explained that the complementary use of theories is attributed to the difference in their focus, strengths and weaknesses.

When selecting a theory, one must understand its focus, strengths, and weaknesses. This is important to enable a correct representation of the theory's focus during its application. The study's comprehensiveness is undermined without understanding the theory's strengths and weaknesses (Tarhini et al., 2015). When a researcher does not understand the theory's weaknesses and strengths, it limits the researcher's capability to use the theory's lenses extensively to guide the study. Truex et al. (2006) explain that not understanding the theory's weaknesses and strengths leads to misinterpretation of the underlying notions about the nature of reality and how knowledge is acquired, which is implicit in the theory. The weaknesses and strengths of the most used theories in IS studies are presented in Table 2.

Table 2: Strengths and Challenges

Theory	Focus and Strength	Weakness and Challenge
Activity Theory	<ul style="list-style-type: none"> • Relationships and Interactions • Regulations • Consciousness • Activity levels • Interconnection • People and process • Social-cultural • Internalisation and externalisation 	<ul style="list-style-type: none"> • Subject as living beings only. • Deep cultural and historical background. • Subject being an individual or group of individuals.
Actor-network Theory	<ul style="list-style-type: none"> • Building Networks • People • Interactions and Relationships • Negotiations • Translation • Follow the actors 	<ul style="list-style-type: none"> • Not considering macro-social structures. • Its stance on moral and political issues. • Symmetrical treatment of humans and non-humans. • Tendency to describe as opposed to explain
Contingency Theory	<ul style="list-style-type: none"> • Contextualisation • Organisation strategy • Organisational structure • Fit and performance • Change management • Subsystems • Interrelationships 	<ul style="list-style-type: none"> • No unique formula for the measurement of effective performance. • No clear guidance on how to identify the most appropriate management structure
Diffusion of Innovation	<ul style="list-style-type: none"> • Dissemination • Communication channels • Process and speed • Rejection and Adoption • Relationships and Interaction 	<ul style="list-style-type: none"> • Silent on cultural differences. • A lack of focus on economic factors. • Does not provide a guide on how to address conflicts of interest, and linearity.
Grounded Theory	<ul style="list-style-type: none"> • Iterative process • Trail of information • Solution grounded in data • Sociotechnical behaviours • Interrelationship • Process and people 	<ul style="list-style-type: none"> • Ambiguity whether research design or method. • Does not provide a guide on when to reach the point of saturation.
Structuration Theory	<ul style="list-style-type: none"> • Duality • Power and Structure • Interactions and Relationships • People and process • Recursiveness of action 	<ul style="list-style-type: none"> • Structures instantiated only through actions. • No focus on the roles of actors in the production and reproduction of structures.
Technology Acceptance Model	<ul style="list-style-type: none"> • Technology • People • Interaction • Rules • Processes • Behaviour • Acceptance 	<ul style="list-style-type: none"> • No focus on factors influencing ease of use and usefulness of systems. • More emphasis on ease of use and usefulness variables. • Variables based on perceptions. • A little guidance on how to increase user acceptance

4.3 Step #3: Mapping Attributes With Capability

The third step entails mapping the attributes of the research objectives from Step #1 with the strengths and weaknesses of the theories from Step #2. As shown in Table 3 below, mapping represents a matrix process where the focus of the objectives is classified into rows and the IS theories in columns, indicative of appropriateness. The matrix constitutes cells, which are the interconnection between the rows (objective attributes) and columns (IS theories). Each matrix cell weighs 1 point (marked 'X'), an example in Table 3. To conduct the mapping process, the researcher is guided by the following rules: (1) for each objective attribute, determine whether it's a theory's strength or weakness; (2) for each objective attribute which is a specific theory's strength – insert a cross mark (X) in the respective intersection cell; (3) tally all points allocated for each cell and record the total at the bottom for each respective theory column. The theory with the highest total sum of appropriateness is considered the most suitable to underpin a study.

Table 3: Mapping attributes with capability

Focus	AT	ANT	CT	DOI	GT	ST	TAM
Relationships	X	X					
Regulations		X	X				
Interactions			X	X			
Artefacts/technology				X	X	X	
Interconnection					X	X	
People					X	X	X
Process						X	X
Negotiations							X
Rules							
Structure							
Total	2	2	2	2	3	4	3

In the case of different theories having the same highest total, it appears that more than one theory could be suitable. This is often attributed to the proximity of theories' strengths. Unfortunately, when only one theory is required, then opt for the theory that encompasses most of the objective attributes as a strength.

5. Conclusion

The three-step approach proposed in this paper enables research contributions from two perspectives, primarily. First, it improves the rigour of research from a qualitative standpoint. This includes addressing inconsistencies in conducting qualitative research. Secondly, it advances the use of sociotechnical theories to underpin IS research. This increases multidisciplinary research because many of the theories are rooted in sociology and philosophy. This study highlights the critical challenges, such as the difficulty in identifying and distinguishing the vocabularies used in the theories. This is a specific area where many postgraduates and those new to applying sociotechnical are mostly challenged. The proposed guide has the potential to advance interest and use of the theories by IS postgraduate students. The guide provides a step-by-step guide that can be employed by researchers to improve the consistency and rigour of their studies.

Ethics Declaration

No ethics clearance was required for this research.

AI Declaration

No artificial intelligence tools were used in this paper.

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Two-Eyed Seeing in Business Scholarship: A Framework for Indigenous and Non-Indigenous Research

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Abstract This paper explores the concept of Two-Eyed Seeing, a guiding principle for integrating Indigenous and Western knowledge systems, in business research. By viewing the world through both perspectives, researchers can foster a more inclusive understanding of complex issues. This paper employs a framework established by Reid et al (2021) to explore Indigenous and non-Indigenous research. Engaging business scholarship with a Two-Eyed Seeing approach provides opportunities to enhance cultural competence, generate innovative insights, and contribute to reconciliation efforts, promoting ethical practices and meaningful collaborations between Indigenous and non-Indigenous communities.

Keywords Two-Eyed Seeing, Business Research, Indigenous Methodologies, Reconciliation, Decolonisation

1. Introduction

The concept of Two-Eyed Seeing is a guiding principle for integrating Indigenous and Western ways of knowledge creation. This paper explores the application of Two-Eyed Seeing within business scholarship. Two-Eyed Seeing encourages researchers to view the world through both Indigenous and Western perspectives, recognising the strengths of each (Bartlett, et al, 2012). This approach fosters a more inclusive understanding of complex issues, particularly those involving cross-cultural and interdisciplinary contexts.

The historical context of research involving Indigenous peoples has been fraught with ethical challenges and exploitation. Eurocentric research paradigms often dismissed Indigenous epistemologies, leading to biased portrayals and reinforcing colonial narratives. Smith (2021) critiques how Western academia constructs hierarchies of knowledge that prioritise positivist, empirical, and objective knowledge, while dismissing relational, narrative, spiritual, or place-based Indigenous epistemologies as less rigorous or unscientific. In response, Indigenous scholars have advocated for decolonising research methodologies that prioritise Indigenous voices and knowledge systems (Kovach, 2021; Wilson, 2008). Challenging and transforming the ways knowledge is traditionally produced, validated, and used—especially within Eurocentric academic frameworks so that they are more inclusive of and accountable to Indigenous ways of knowing, being, and doing promotes the decolonisation of academic research (Wilson, 2008). The contextualisation of employing Two-Eyed Seeing in business scholarship discussed in this paper contributes to academic research on decolonisation and reconciliation.

2. Locating Myself in Research

Kovach (2021) believes that researchers must assert their positionality when conducting Indigenous research and Indigenous researchers, in particular, must state how we are connected to our community. In Mi'kmaq, Msit No'kmaq translates to 'all my relations' and this concept holds me accountable to reflect on who I am as Mi'kmaw and how my Indigeneity shapes the way I experience and engage with my community. It calls on me to honour all my relations, including my ancestors, community and all living and non-living things (Samms Hurley & Jackson, 2020). As I navigate my work, Msit No'kmaq reminds me that our relational worldview is not just a personal guide but an essential research framework. It affirms the significance of Indigenous knowledge systems and relationality in shaping meaningful and ethical scholarship.

I am of mixed Mi'kmaq/European ancestry and a member of Qalipu First Nation. I grew up in Elmastukewek (Bay of Islands) in Newfoundland and Labrador, Canada. I inherit my Mi'kmaw ancestry from both parents. I am connected to community through my volunteer work and I am often invited to speak at conferences as a Mi'kmaw business owner. In my role as an Assistant Professor, I am recognised as a Mi'kmaw scholar, and I often speak on topics such as the experience of an Indigenous faculty member navigating a colonial institution and Indigenising business curriculum.

I am also a Chartered Professional Accountant (CPA), yet my business ownership in the tourism sector inspired me to explore research in the field of Indigenous tourism. The dichotomy of my career choice as a CPA and my embrace of my Mi'kmaw heritage led me to explore how research can help Indigenous communities. Employing

Indigenous methodologies, including Two-Eyed Seeing, in my research further helps my community and informs other researchers of the versatility of this inclusive approach to scholarship.

Through my research I have found myself on a personal journey of reconnection. Engaging with my research has enriched my academic understanding and opened a path for me to become more involved in my own Mi'kmaw community. This process has helped me uncover parts of my identity that I had previously kept at a distance, allowing me to embrace and celebrate this side of myself. I am building relationships, participating in cultural events, and finding a sense of belonging that is grounding and transformative. My research isn't just shaping my academic work – it is reshaping how I see myself in the world.

3. Context

Research involving Indigenous peoples has a troubling history, characterised by unethical practices and exploitation. Researchers have historically approached Indigenous communities as subjects rather than partners, extracting knowledge without consent (David-Chavez & Gavin, 2018; Emanuel and Bird, 2022) and using it in ways that have perpetuated negative stereotypes and colonial agendas (Barton et al, 2024; Emanuel and Bird, 2022). Other ethical issues include data collected without consent, data used for purposes other than what was originally stated, and failure to provide credit to the Indigenous participants (Barton et al, 2024; David-Chavez & Gavin, 2018; Guede & Guimarães, 2020). This history reveals a pattern of exploitation and misrepresentation rooted in power dynamics. It has also created a legacy of mistrust and trauma within Indigenous communities (Smith, 2021).

Researchers often viewed Indigenous cultures as primitive and uncivilised, and felt entitled to enter Indigenous communities without informed consent or respect for Indigenous autonomy. This extractive approach led to biased or incomplete portrayals that reinforced colonial narratives of Indigenous inferiority and primitivism (Smith, 2021). Studies were also conducted to justify the assimilation of Indigenous peoples into dominant society. Researchers, often funded by colonial governments, framed traditional practices as obstacles to civilisation and progress, pathologising Indigenous cultures in the process (Milloy, 1999).

Western research paradigms have often dismissed Indigenous epistemologies, framing them as anecdotal or unscientific. This epistemic injustice has contributed to the erasure of Indigenous contributions to fields such as environmental stewardship, medicine, and social governance (Smith, 2000).

The legacy of epistemic injustice has had lasting negative impacts on Indigenous communities, creating a deep mistrust of research institutions and researchers. This mistrust makes it difficult to conduct ethical research that could benefit Indigenous communities. In response to these historical injustices, Indigenous scholars and communities have advocated for decolonising research methodologies (Chilisa, 2020; Kovach, 2021; Wilson, 2008). Smith (2021) emphasises the importance of research approaches that prioritise Indigenous voices, knowledges, and self-determination. Ethical research practices now increasingly involve community-based research which fosters collaborative relationships and ensures that research benefits Indigenous communities. Many research institutions have developed guidelines and protocols to ensure that research is conducted in a respectful and culturally sensitive manner (Tri-Council Policy Statement – 2, 2022). Consequently, where once research was conducted unethically on Indigenous Peoples, it is now acceptable to engage in research *with* or *for* Indigenous Peoples which requires the consent, knowledge co-creation, and dissemination of Indigenous Peoples to ensure the research is conducted ethically and appropriately (Smith, 2021).

4. *Etuaptmumk* - Two-Eyed Seeing

Etuaptmumk - Two-Eyed Seeing was proposed by Mi'kmaq Elder Albert Marshall and his wife, Elder Murdena Marshall, "to see from one eye with the strengths of Indigenous knowledges and ways of knowing, and from the other eye with the strengths of Western knowledges and ways of knowing ... and learning to use both these eyes together, for the benefit of all." (Two-Eyed Seeing, n.d.). The core principles of Two-Eyed Seeing — recognising the strengths of both knowledge systems, emphasising interconnection and relationality, and supporting inclusivity and reciprocity — make it particularly suited for addressing interdisciplinary and cross-cultural issues. By employing Two-Eyed Seeing, scholars can generate innovative insights and contribute to reconciliation by valuing Indigenous knowledge systems and addressing historical inequities (Bartlett, et al, 2012).

The former Institute for Integrative Science and Health (IISH) at Cape Breton University in Cape Breton (Unamaki), Nova Scotia, the home of several Mi'kmaq communities, assisted Elder Albert and Elder Murdena to

cultivate their concept of Two-Eyed Seeing. Elder Albert acknowledges the challenges some scholars may have with accepting Two-Eyed Seeing:

Two-Eyed Seeing is hard to convey to academics as it does not fit into any particular subject area or discipline. Rather, it is about life: what you do, what kind of responsibilities you have, how you should live while on Earth ... i.e., a guiding principle that covers all aspects of our lives: social, economic, environmental, etc. The advantage of Two-Eyed Seeing is that you are always fine tuning your mind into different places at once, you are always looking for another perspective and better way of doing things (Bartlett et al, 2012, p.336).

Elders Marshall do not seek to blend Western and Indigenous perspectives into a single view. Instead, Two-Eyed Seeing encourages researchers to appreciate the distinct strengths of each approach and to use them in conjunction with one another to gain a more comprehensive understanding. It acknowledges that each perspective has its own unique insights and limitations, and that by bringing them together, scholars can achieve a more complete understanding of their research. The foundations of Two-Eyed Seeing lie with the teachings of Chief Charles Labrador who states: "Go into a forest, you see the birch, maple, pine. Look underground and all those trees are holding hands. We as people must do the same" (Trees holding hands n.d.)

The IISH created an image (Figure 1) of two eyes placed upon connected pieces of a jigsaw puzzle. This image is based upon Elder Albert's emphasis that Mi'kmaw knowledge is just one piece of a multitude of Indigenous knowledge systems. Elder Albert further emphasises that "the two jig-saw puzzle pieces help remind us that, with respect to Aboriginal Traditional Knowledges [Indigenous knowledges], no one person ever has more than one small piece of the knowledge. There is a need to recognise that Traditional Knowledges draw upon the community of Elders and other Knowledge Holders (i.e., the knowledge is collective), as well as the collective consciousness of the people. So, here too, one might wish to talk about multiple-eyed seeing." (Two-Eyed Seeing, n.d.).

Figure 1: Representation of Two-Eyed Seeing by the Institute for Integrative Science and Health

Reid et al (2021) proposed a framework for applying Two-Eyed Seeing in research (Figure 2). This framework, centred on Two-Eyed Seeing, proposes a circular, stepwise co-learning process that begins with a mutual research interest, then proceeds to identifying research tools. The partners must co-develop the research program and together achieve validation from the community. Within this framework, all partners must receive recognition and in turn, a long-term relationship is established.

Figure 2: A framework for applying Two-Eyed Seeing in research by Reid et al (2021).

Embracing Indigenous methodologies is particularly relevant for research in Canada, where reconciliation with Indigenous Peoples is a priority for the country. The historical experience of encounters with European settlers has had a long-lasting impact upon Indigenous communities in Canada. The legacy of colonialism resulted in then-Prime Minister Harper officially apologising to Indigenous Peoples for the harm caused by colonial policies, particularly the residential school system (Statement of apology to former students of Indian Residential Schools, 2008). The federal government established a Truth and Reconciliation Commission (TRC) whose mandate was to hear the stories of residential school survivors and establish mechanisms for reconciliation with Indigenous Peoples. The TRC delivered their final report in 2015 and included 94 Calls to Action, compelling all facets of Canadian society to engage in reconciliation. The TRC Report specifically recommends academic research and calls for the business sector to commit to reconciliation (Truth and Reconciliation Commission of Canada, 2015). Since the TRC's report, the public discourse has broadened to include economic reconciliation that declares the importance of opportunities for Indigenous participation in the Canadian economy (Hilton, 2021). The TRC's call for academic research and the public prioritisation of reconciliation provides ample opportunities for the merging of Indigenous methodologies within business research.

Two-Eyed Seeing has been embraced by many disciplines in Canada, such as nursing (McFadden et al, 2023); fisheries science (Reid et al, 2021), and education (Bardwell & Woller-Skar, 2023; Cirkony, et al, 2023). Business scholarship, however, has not yet adopted Two-Eyed Seeing despite having opportunity in fields, such as management decision-making, social responsibility, and business ethics, that lean towards engaging with Indigenous methodologies. Harmonising Western research frameworks with Indigenous methodologies can bridge the gap between knowledge systems. Such an integration supports the processes of reconciliation and decolonisation that will help level power imbalances within academic scholarship.

5. Business Scholarship

Business research, as with all academic knowledge creation, is shaped by the philosophical position of the researcher and the discipline within which they are studying. The epistemological, ontological, axiological, and methodological foundations of a research program underpin the worldviews of the researcher, their values, and perspectives of reality. Basic business research aims to expand knowledge, while applied business research focuses on solving specific problems (Bryman and Bell, 2015). Cooper and Schindler (2014) state that business research can be of an applied nature by answering questions that aid in managerial decision-making, or pure research, which does not directly impact policy or performance decisions, but rather involves creating new knowledge. As such, business scholarship relies heavily on the Western predominance of research paradigms.

The nature of business involves numerous sub-fields such as finance, marketing, organisational behaviour, entrepreneurship, human resource management, and strategy. The broad nature of the field of business research provides opportunities to utilise Two-Eyed Seeing as a means of respectfully engaging with Indigenous methodologies in scholarship.

6. Understanding Indigenous Methodologies

Indigenous methodologies are a research approach rooted in the cultural, spiritual, and relational worldviews of Indigenous peoples. These methodologies prioritise the interconnectedness of all beings, the importance of community, and the responsibility of researchers to honour the knowledge systems and traditions of the communities with which they engage. Indigenous scholars have been instrumental in advancing research methodologies, highlighting the significance of relational accountability, reciprocity, responsibility, and decolonisation in research (Chilisa, 2020; Kovach, 2021; Wilson, 2008).

Indigenous epistemologies reflect how Indigenous peoples produce knowledge. A key element of these epistemologies is the belief that knowledge is relational, involving relationships among people, spirituality, and the natural world. Unlike Western epistemologies, Indigenous knowledge systems are holistic, emphasising both the metaphysical and pragmatic within an animate language structure and contextualised within place and land-based knowing and teachings. These knowledges are generated from worldviews, histories, spiritualities, cultural practices, and ceremonies (Kovach, 2021; Wilson, 2008).

Indigenous epistemologies are embedded within a relational axiology that emphasises relational accountability, and respectful representation during the research process. These values are rooted in Indigenous cultural and spiritual practices and are essential for conducting ethical research with Indigenous communities. Relational accountability involves understanding the relationships among all aspects of the research process and the fact that the researcher is accountable to the communities they work with, prioritising community needs and concerns. Respectful representation requires researchers to honour the dignity, knowledge, perspective, and experiences of Indigenous peoples, extending respect to the community, ancestors, and the natural and spiritual worlds (Chilisa, 2020; Kovach, 2021; Wilson, 2008).

Indigenous research paradigms are grounded in decolonisation and Indigenisation. Decolonisation in research involves dismantling power structures and colonial epistemologies, recognising the historical and ongoing impacts of colonisation on Indigenous peoples and their knowledge systems. Indigenisation focuses on affirming Indigenous knowledge systems by incorporating Indigenous methodologies, research questions, and ethical frameworks into the research process. Indigenous research centres the lived experiences and perspectives of Indigenous communities, prioritising knowledge that is relevant and beneficial to their needs (Chilisa, 2020; Kovach, 2021).

The foundation of Indigenous methodologies is relational accountability, which highlights that knowledge resides within the context of relationships between individuals, communities, the land, and the cosmos. Researchers are not merely objective observers but active participants within a network of relationships. This perspective requires researchers to engage with Indigenous communities with respect, reciprocity, and responsibility. Respect involves honouring the knowledge holders and adhering to cultural protocols. Reciprocity ensures that researchers give back to the community in meaningful ways, transforming research from an extractive process to a collaborative and mutually beneficial exchange. Responsibility extends beyond individual ethics to encompass a broader obligation to the community, the environment, and future generations. Researchers must ensure the integrity of the community's knowledge systems is maintained, being transparent, accountable, and responsive to the needs and concerns of the community throughout the research process (Kovach, 2021; Wilson, 2008).

Building meaningful relationships with Indigenous communities is essential to recognising their right to guide the research agenda. Participatory and emancipatory research methods are crucial for decolonisation, contributing to community empowerment. Ethical considerations are paramount in Indigenous research, including obtaining informed consent, establishing ownership of data, and adhering to cultural protocols. Researchers must also use culturally appropriate methods and tools, such as storytelling and sharing circles (Kovach, 2021; Wilson, 2008).

Storytelling is central to Indigenous methodologies as it conveys cultural values, histories, and worldviews. Storytelling is not just a communication tool but an epistemological framework that preserves the wisdom and experiences of ancestors. Through stories, knowledge is transmitted across generations, maintaining the continuity of cultural traditions. Indigenous methodologies are holistic, integrating physical, emotional, mental, and spiritual dimensions of knowledge. This approach contrasts with the compartmentalised nature of Western research methodologies. Storytelling allows for multiple perspectives and honours participants' voices, validating Indigenous ways of knowing, and challenging dominant Western narratives in academic research (Iseke, 2013; Kovach, 2021).

Sharing circles are a key Indigenous research method rooted in traditional practices that emphasise relationality, respect, and community engagement. Sharing circles create a safe, inclusive space where participants can share their experiences and perspectives without fear of judgment. The method aligns with Indigenous worldviews by prioritising oral traditions and collective knowledge construction (Lavallée, 2009).

In sharing circles, participants typically sit in a circle, symbolising equality and unity, and often follow protocols such as the use of a talking piece, which is passed around to ensure everyone has an opportunity to speak. This structure fosters active listening and mutual respect, encouraging participants to reflect on the topics discussed. Lavallée (2009) highlights that this method, in addition to a means of collecting data, also serves as a form of empowerment for participants, as their voices are validated within the research process.

In examining Two-Eyed Seeing in business scholarship, I propose that integrating Indigenous and Western methodologies enhances the depth and breadth of business research and encourages a more inclusive academic environment. By valuing and incorporating Indigenous perspectives, business researchers can address historical inequities caused by unethical research practices and contribute to the broader goals of reconciliation, Indigenisation, and decolonisation.

7. Operationalising Two-Eyed Seeing in Business Scholarship

Two-Eyed Seeing can be incorporated into business research to create a supportive opportunity for Indigenous scholarship. Whether conducting research *with* or *for* Indigenous communities, or using Indigenous methodologies in Western-focused studies, the principles of Two-Eyed Seeing can be implemented in business research.

Recognising the significance of Indigenous participation in the economy (Hilton, 2021), as well as the TRC's calls for academic institutions to engage in reconciliation research provides the justification for business researchers to co-create knowledge with Indigenous Peoples. Since business has yet to embrace Two-Eyed Seeing as an approach to research, I outline how a co-learning approach can be undertaken using two business organisations: one with Indigenous ownership and another is a non-Indigenous social enterprise. I selected these organisations because they are well-known in Eastern Canada and both have significant community impact.

Clearwater Seafoods Incorporated is one of the largest fully integrated seafood corporations in North America. In 2021, Clearwater was acquired by a Mi'kmaq-owned coalition and Premium Brands Food of British Columbia for \$1 billion. The acquisition represents the largest investment in the seafood industry by an Indigenous group in Canada. For the Mi'kmaq First Nations, a 50% ownership in Clearwater embodies an opportunity to become notable participants in the commercial fishery, gain ownership of lucrative offshore fishing licenses, and advance the economic prosperity of their communities. For Premium Brands, it provides an opportunity to expand its seafood portfolio and leverage Clearwater's global distribution network and expertise (Doucette & Stack, 2024).

Shorefast Foundation is a social enterprise located on Fogo Island, off the northeast coast of Newfoundland and Labrador. Conceived by three siblings from Fogo Island, the Foundation constructed a luxury inn as a response to the economic and social challenges faced by Fogo Islanders following the collapse of the cod fishery, with the goal of regenerating the local economy without sacrificing identity, culture, or ecological integrity (Shorefast.org). The Fogo Island Inn is a model of place-based development. Every aspect of the Inn, from its architecture and furniture to its food and programming, reflects the traditions and stories of the island. Local

artisans, fishers, and community members are integral to its operations (Slawinski et al, 2019). Profits from the Inn are reinvested into the community through initiatives in art, business, and heritage preservation, aligning with the Foundation’s principle of "economic nutrition", a transparent approach to understanding where money goes and who benefits (Shorefast.org).

Table 1 presents a comparison of how Two-Eyed Seeing can be operationalised in research involving an Indigenous-led and a non-Indigenous organisation. Using the elements proposed in Reid et al’s (2021) framework, this comparison illustrates that Two-Eyed Seeing is applicable to business research, including non-Indigenous businesses. It may seem apparent that Clearwater Seafoods, an Indigenous-led business, is apt for application of Two-Eyed Seeing. Less obvious, however, is employing this concept in non-Indigenous organisations such as Shorefast Foundation. Each element of Reid et al (2021) is discussed from an Indigenous, (or in the case of Shorefast, a local/community level) perspective, and Western perspective, and Two-Eyed Seeing.

Table 1: Comparison of Operationalising Two-Eyed Seeing in an Indigenous-led business and a non-Indigenous social enterprise.

Two-Eyed Seeing Framework Element (Reid et al., 2021)	Clearwater Seafoods	Fogo Island Inn (Shorefast Foundation)
Mutual Research Interest	<p>Indigenous Eye Interest in reclaiming stewardship over marine resources and asserting economic sovereignty.</p> <p>Western Eye Interest in corporate investment, profitability, and sustainable resource management.</p> <p>Two-Eyed Seeing The acquisition becomes an intersection of Indigenous values of stewardship and Western business practices.</p>	<p>Indigenous/Local Eye Preserving culture, place-based knowledge, and community prosperity.</p> <p>Western Eye Interest in innovative models of rural economic development, sustainable tourism, and social enterprise.</p> <p>Two-Eyed Seeing Aligning goals to explore how social enterprise can regenerate local economies while centering community values and environmental stewardship.</p>
Identification of Required Tools	<p>Indigenous Tools Traditional ecological knowledge, community engagement, relational accountability.</p> <p>Western Tools Corporate finance, due diligence, supply chain management.</p> <p>Two-Eyed Seeing The partnership required both sets of tools to secure funding and develop long-term governance structures that respect Indigenous values.</p>	<p>Local/Traditional Tools Oral history, lived experience, community storytelling, traditional artisanship.</p> <p>Western Tools Business modelling, social return on investment, tourism analytics.</p> <p>Two-Eyed Seeing Use both financial tools and narrative-based evaluation to understand success and sustainability from multiple lenses.</p>
Research Co-development	<p>Two-Eyed Seeing The acquisition was co-developed by Mi’kmaq leaders and corporate partners, ensuring Indigenous priorities shaped business outcomes.</p>	<p>Two-Eyed Seeing Research processes can be co-developed with stakeholders including:</p> <ul style="list-style-type: none"> • Shorefast Foundation • Local artisans, fishers, and elders • Policy-makers and rural development scholars <p>Ensures that the research is not extractive, but rooted in respect and reciprocity, consistent with both Indigenous and community-based research ethics.</p>
Co-evaluation & Community Validation	<p>Indigenous Perspective Validation by Mi’kmaq communities—whether they see this acquisition as aligned with their goals.</p> <p>Western Perspective Metrics such as ROI, supply chain efficiency, market expansion.</p> <p>Two-Eyed Seeing: Success is defined both by community empowerment and by economic indicators.</p>	<p>Local/Indigenous Perspective Validation through pride, storytelling, local well-being, cultural continuity, and youth engagement.</p> <p>Western Perspective Metrics like employment numbers, global tourist visits, profitability, awards won.</p> <p>Two-Eyed Seeing Success is measured by both impact on GDP and impact on the community.</p>

Two-Eyed Seeing Framework Element (Reid et al., 2021)	Clearwater Seafoods	Fogo Island Inn (Shorefast Foundation)
Shared Recognition & Co-benefits	<p>Indigenous Perspective Self-determination, economic participation, job creation for community members.</p> <p>Western Perspective Business growth, enhanced reputation, sustainable practices.</p> <p>Two-Eyed Seeing Recognition of different forms of value (cultural, economic, social) and deliberate sharing of those benefits.</p>	<p>Local/Indigenous Perspective Recognition of traditional knowledge, crafts, and community leadership.</p> <p>Western perspective Recognition of Shorefast as a global leader in social innovation.</p> <p>Two-Eyed Seeing Co-benefits include job creation and cultural renewal; profits are reinvested in the community, not extracted.</p>
Long-term Relationship	<p>The acquisition represents more than a business transaction, it is part of a long-term relational commitment to Indigenous resurgence, stewardship, and capacity building.</p> <p>A Two-Eyed Seeing approach can examine the participation of this Indigenous-led firm within a multi-billion-dollar business dominated by non-Indigenous participants.</p>	<p>Shorefast emphasises "economic nutrition" and long-term community vitality.</p> <p>A Two-Eyed Seeing approach highlights how long-term place-based relationships (to land, sea, and one another) underpin the enterprise.</p>

Reid et al.'s (2021) framework for operationalising Two-Eyed Seeing in research provides a structured approach to integrating Indigenous and Western scholarly perspectives. For instance, a research project might evaluate the impact of an Indigenous-led firm within a predominantly non-Indigenous business sector, or examining how a non-Indigenous organization's traditional knowledge, crafts, and community leadership contribute to its success. This examination could highlight co-benefits such as job creation and cultural renewal, and profit reinvestment in the community for sustained growth.

In Table 1 of Reid et al.'s framework, various dimensions of Two-Eyed Seeing are outlined, demonstrating how long-term relational commitments to Indigenous resurgence, stewardship, and capacity building can be fostered within business research. For example, the framework can be applied to study the practices of Shorefast, an organisation that prioritises "economic nutrition" and community vitality. The framework can also be used to explore the Clearwater acquisition from Indigenous and Western perspectives. Applying Two-Eyed Seeing in these research contexts supports scholarly insight and bolsters community capacity-building and resilience, thereby promoting ethical engagement and comprehensive understanding that transcends traditional research boundaries.

8. Conclusion

Two-Eyed Seeing offers a transformative approach to research by emphasising the integration of Indigenous and Western knowledge systems to encourage reconciliation and Indigenisation in business scholarship. Responding to the TRC's call for academic institutions to engage in reconciliation research, incorporating Two-Eyed Seeing in business research serves as a means of addressing the historical injustices caused by unethical research practices. Two-Eyed Seeing is not only relevant for Indigenous research but is also applicable to incorporating Indigenous methodologies into Western research processes. In doing so, applying Two-Eyed Seeing in business research exemplifies a respectful path forward by engaging in collaborations that benefit both Indigenous and non-Indigenous communities.

Ethical Declaration

Ethics approval was not required for this paper.

AI Declaration

Artificial intelligence tools, specifically ChatGPT and elciti.ai, were used for editing, language refinement, and to search for sources relevant to my topic. The AI-generated content was carefully reviewed by the author to ensure adherence to academic standards.

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Evolving Reflexive Thematic Analysis in Knowledge Management Research

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Abstract: This paper presents a novel approach to the coding practices of Reflexive Thematic Analysis (RTA). The paper offers a working sample from a study exploring Knowledge-sharing (KS) intentions and behaviours of employees within a non-profit organisation. It is claimed that foundational coding practices inform analysts about the creation of reflexive codes. Referred to as 'the coding family', these methodological practices provide a set of conceptual tools that underscore the iterative and dynamic nature of qualitative data analysis. All of which culminate in theme generation. The paper focuses on the iterative and flexible approach that leads to the development of themes. Significantly, the paper presents an understanding of the organisational ecosystem by introducing what is termed 'Axial Connections'. These axial connections highlight the dynamic nature of organisational constructs that influence employee KS intentions and behaviour. Twelve axial connections are derived from and generated by the coding family practices illustrated within this paper. The rationale behind this evolved approach is to attempt to reconcile Braun and Clarke's playful cry to "be reflexive, be reflexive!" as it continues to be a cause of concern for novice researchers and experienced academics. The method provided aims to ensure that the analytical process remains aligned with the 'guidelines' of RTA. It is proposed that the analytical method of interpreting and understanding data begins with acknowledging the emotional connection a participant has towards a given interview question. As part of the coding family, emotions convey different meanings, leading to different interpretations. Additionally, values coding and In-Vivo coding represent valid members that ultimately lead to interpretive reflexive coding. Values coding relates to the participants' worldviews, portraying the values participants hold towards various experiences. Values are fundamentally connected to emotions, and emotions are deeply connected to values. Conversely, In-Vivo or verbatim coding is considered acceptable, as it can convey meaning that aligns with that of the researcher. By providing a foundational coding approach, this paper aims to reduce the ambiguity surrounding coding within the School of RTA. Notably, the working example demonstrates how the 12 axial connections interact with one another to influence the KS intentions and behaviour of the employee. Finally, it will be shown how the employees perceive the axial connections in different ways, resulting in different outcomes towards their willingness to KS.

Keywords: Qualitative Research, Reflexive Thematic Analysis, Braun and Clarke, Knowledge Sharing, Organisational Ecosystem

1. Introduction

"Be a thoughtful researcher, do not just slavishly follow what methodology writers say...we provide a compass and a map to navigate your adventure," are words offered for consideration for the novice researcher (Braun and Clarke, 2021b, p. 343-344). While RTA is considered flexible and inviting to the novice researcher or indeed that of any researcher seeking to explore lived experiences, Braun and Clarke became somewhat perplexed in how their RTA method of analysis is conducted, see Braun and Clarke (2021b) for their 10-problem critique and Braun and Clarke (2019, p. 591) regarding their "we assumed most people would 'get it', would understand our assumptions. How wrong we were!" rhetoric. This paper addresses some of these perplexities by presenting a working example of RTA. It is suggested that there is a need to step back from consideration of what is reflexive coding and ask, "How am I getting to present this reflexive code?"

This research utilises coding practices set out by Saldaña (2016). The study does not reject Braun and Clarke's reflexive TA; instead, it proposes enriching the analytical approach. It is suggested that the analytical process begins with acknowledging the emotional connection and the values attached to a participant's emotions towards a given interview question or topic. Emotions convey different meanings for different participants and therefore result in different interpretations. Additionally, emotions are intertwined with values, and values are intertwined with emotions as they connect with the inner cognitive scheme of participants (Saldaña, 2016; Kouamé and Liu, 2021). Additionally, the analysis remains open to In-Vivo coding, as the interpretation of participant responses can mirror that of the researcher's cognitive horizon of understanding (Braun and Clarke, 2012). RTA, unknowingly, supports the use of emotion coding when discussing how, during the first phase of RTA, participants "orient themselves to questions" and recognise "the different emotional responses to the research topic" (Terry *et al.*, 2017, p.29). Braun and Clarke also acknowledge the need to recognise the emotional impact that phase one, familiarisation, has on a researcher (Braun and Clarke, 2021a). Finally, as the coding

family develops, it is maintained that there are dynamic constructs influencing how and why employees share their knowledge. This research offers 12 dynamic influential constructs, referred to as 'axial connection'. These axial connections illustrate the frenetic nature of the organisational ecosystem. Each axial connection is influenced by and has an influence on employee KS intentions and behaviour. Likewise, it is philosophically and theoretically posited that each participant influences the intentions and behaviour of other employees.

2. The Coding Family Within Qualitative Research and Data Analysis

The focus of qualitative methodology is multi-paradigmatic and multi-method, acknowledging the researcher's role in investigating participants' experiences, attitudes, beliefs, and thoughts on a specific area of inquiry (Denzin & Lincoln, 2005; Patton, 1982). Data analysis is predicated on the reflexive, iterative process that necessitates reconsidering initial concepts and developing novel interpretations that address the research question regarding what influences employees' KS intentions and behaviour. The methodology adopted to answer this requires the researcher to...

...be a good [craftsperson]: avoid any rigid set of procedures [and] let every [researcher] be [their] own methodologist; let every [researcher] be [their] own theorist; let theory and method again become part of the practice of a craft

(Rolfe, 2011, p. 115)

The quote above exemplifies the approach to RTA within this paper and echoes Braun and Clarke's PhD supervisor, who states that "qualitative research is about fun, play and creativity" (Braun and Clarke, 2019, p. 592). To that end, this research viewed the process of RTA as "a starting point for [my] journey, [and] not a map" to be rigorously followed (Braun, Clarke and Hayfield, 2022, p. 424). As such, this research presents how, through the application of three coding practices, the stage of reflexive coding is ultimately developed, thereby completing the coding family process. See Figure 1: The Coding Family.

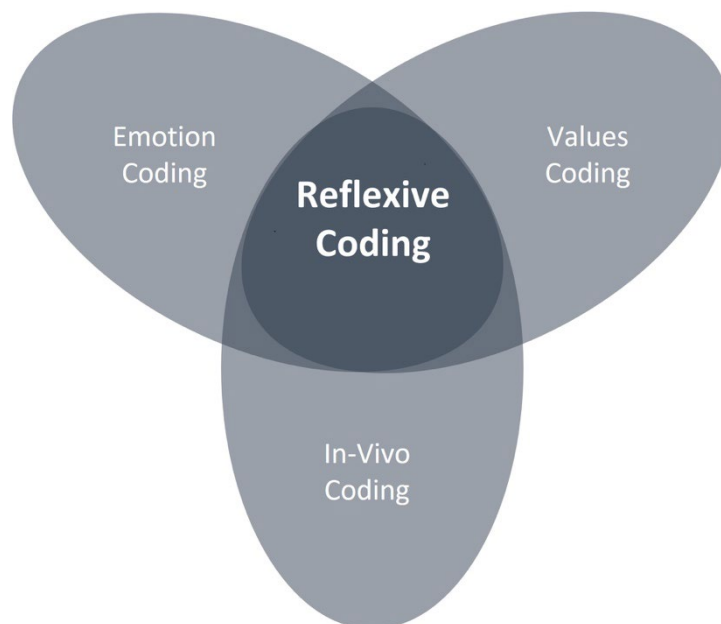


Figure 1: The coding family

3. Emotion, Values and In-vivo Coding in Practice

Emotions portray the intentionality of an action; that is, the emotions shown by the participants provide an added, nuanced understanding of the spoken word. In other words, emotional intentionality affects employees' emotional connection to the outside world (Goldie, 2002; Ratcliffe, 2019). The use of emotion coding is seen as an "affective method" of using the researcher's subjectivity to embrace naturalistic motives and reactions (Saldaña, 2016, p. 124). Saldaña (2016) continues to argue that emotion coding is beneficial when "exploring intrapersonal and interpersonal experiences and actions, especially in matters of social relationships, reasoning, decision-making, judgment, and risk taking" (Saldaña, 2016, p.125). Significantly, different emotions can offer

different interpretations and meanings manifested through the facial expressions and tone of a participant (Liu and Maitlis, 2014; Keltner, 2019) that the researcher observes during the interview and data collection process. Participants' body language, and in some cases, facial expressions, provide implicit inferences attached to the spoken word (Zhou and Tingqin, 2008; Yeong *et al.*, 2018). By observing the participants and my emotional responses, a deeper interpretation and understanding of the data is realised (Braun and Clarke, 2021a).

Values are fundamentally connected to emotions, and emotions are fundamentally connected to values (Conte, Hahnel and Brosch, 2023). Values coding involves first-round coding that relates to the participants' worldviews and portrays the values and beliefs of participants and how they consider their intrapersonal and interpersonal experiences (Easterby-Smith, Thorpe and Jackson, 2015; Saldaña, 2016). The use of values coding proved beneficial in understanding the values participants held concerning the sharing of knowledge within this community-based service provider.

Figure 2: Emotion and values coding in practice provides an example of how the analysis begins by identifying the emotional attachment the participant has towards a given topic, while also presenting the values the participant holds concerning the provided answer. The researcher creates the emotion code titles based on works by Susanto *et al.* (2020) and Keltner and Cowen (2021). The participant portrayed a sense of eagerness while answering the question, which implies that one of their values is to seek out opportunities to help other colleagues. This interpretation of holding the value to assist others comes from the totality of the interview. The analyst develops an appreciation for who the participant is and what they have a sense of.

Interview data	Emotion Coding	Values coding	Interpretive reflexive coding	Axial connection
It's probably in a way opportunistic because something will crop up...lot of...when did you send that? Where did you send the referral to?	Eager	Opportunity to help others	Wanting to give as much assistance as possible	Organisational commitment

Figure 2: Emotion and values coding in practice

To illustrate In-vivo coding and its justification in its usage, a sample from another participant is provided. Somewhat controversially, this research posits that In-vivo coding can and should be utilised in the creation of reflexive codes. In Vivo coding or "verbatim coding" requires the researcher to take a word or phrase directly from data (Given, 2008; Saldaña, 2016, p. 105). While placing the researcher "front and center" of the analysis, there is also a fusion of horizons between that of the participant and the researcher (Gadamer, 2004; Braun and Clarke, 2021a, p. 9). This fusion can instil a commonality of interpretation regarding how a participant interprets a research question and how the interpreter understands the meaning of the interview. Figure 3: In-vivo coding in practice offers a sample from another participant's response to a question related to being asked to share knowledge with other employees.

Interview data	Emotion Coding	In-vivo coding	Interpretive reflexive coding	Axial connection
It actually felt nice. I felt honoured and privileged that they asked me	Pride	Honoured and privileged	Having a sense of belonging	Professional Identity

Figure 3: In-vivo coding in practice

The above coding family leads the researcher towards the development of the reflexive code, as illustrated in Figures 2 and 3: Emotion and values coding in practice and In-vivo coding in practice. The examples also provide a snapshot of how interpretive reflexive coding generates the axial connections. The above examples illustrate two of the twelve axial connections: organisational commitment and professional identity. These are generated by the researcher's interpretation of data and the link that the interpretive reflexive code has towards each participant. In building this scaffolding of understanding, this research offers a deeper insight into how participants perceive reality in diverse ways. What one participant sees as a positive might be viewed as a negative for another: hence, the dynamic nature of the axial connections. It is acknowledged that due to the

limitations of this paper, Section 4. Axial connection cannot provide illustrations for each of the twelve axial connections. Instead, a succinct profile is provided, accompanied by commentary based on the data. This will enable the reader to gain a comprehensive understanding of the influential constructs of the axial connections while presenting their dynamic nature.

4. Reflexivity, Axial Connections and the Coding Family

To be reflexive requires the researcher to present “fore-having, fore-sight, and fore-conception” (Gadamer, 1988, p. 232; Heidegger, 2010, p. 146). Fore-having is the immersion into data, fore-sight offers assumptions of immersion, and fore-conception is the creation of meaning from data that is presented through scientific endeavours (Gadamer, 2004; Warnke, 2011; Tomkins and Eatough, 2018). To be reflexive means to continuously enter into the sphere of conscious self-awareness and take ownership of the perspectives towards that self-awareness (Rennie, 2004; Braun and Clarke, 2021a). In doing so, the current research develops assumptions regarding data, incorporating reflexivity into the reflections to address these assumptions and generate new meanings consciously so that knowledge creation intersects at what Gadamer would refer to as the ‘fusion of horizons’ (Gadamer, 2004).

Following the introduction of the coding family and their interrelationship in the creation of reflexive codes, this research suggests that the organisational ecosystem is comprised of twelve axial connections that influence and are influenced by the employee. As illustrated in Figure 4: Axial connections and employee interaction within the organisational ecosystem, the twelve axial connections represent the subjective understanding of what the reflexive code is saying about what constructs influence the KS intentions and behaviours of employees within this community-based service provider.

For this paper, axial connections are defined as dynamic, influential constructs that revolve around the participant. They influence participants’ KS intentions and behaviour, but are also shaped by participants’ interactions with other participants within the organisation. It is a vibrant system comparable to that professed by the bio-ecological model (Bronfenbrenner and Morris, 2006; Coscioni *et al.*, 2018). Axial connections are viewed as “systems characterised by frenetic activity...due to high levels of ambient stimulation” (Bronfenbrenner and Evans, 2000, p.121). They are derived from the reflexive interpretation of data that centres on and permeates participants’ experiences related to KS. Each employee engages with the axial connections in a distinct manner. Consequently, employees exhibit varying intentions and behaviours towards KS, contingent upon their perception of the impact of each axial connection.

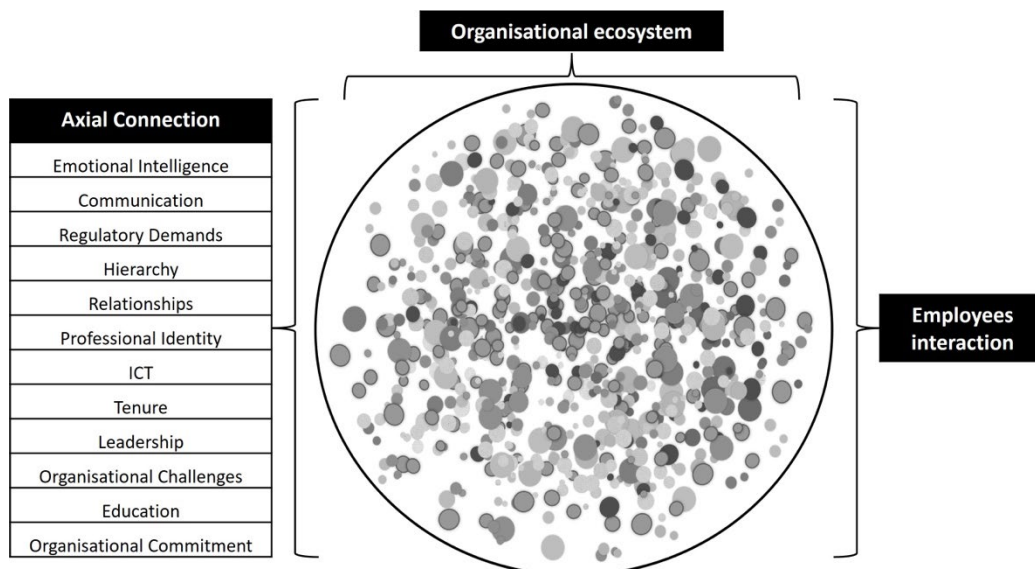


Figure 4: Axial connections and employee interaction within the organisational ecosystem

In summary, data analysis techniques utilising the coding family serve not only as systematic procedures for interpreting this complex contextual data but also as critical tools for generating meaningful insights in the shape of axial connections. Through such methods, RTA researchers can expedite underlying patterns, relationships, and meanings of participants’ experiences. These techniques support the interpretation of raw qualitative data,

guiding it toward coherent findings. Such findings contribute to theoretical development, practical understanding, and contextualised interpretations of knowledge sharing (KS) within community-based service providers. The axial connections (summarised below) are outcomes of 'the coding family' practices in this evolved RTA, which tell a story of the KS intentions and behaviours of the employees within this community-based service provider.-

4.1 Emotional Intelligence

Emotional intelligence facilitates empathetic engagement, supports perspective-taking, and enhances relational depth. Individuals with high emotional intelligence exhibit a greater propensity to share, particularly in emotionally complex situations such as the pandemic. They possess the ability to intuit others' readiness to receive knowledge and adjust their approach accordingly. Emotional intelligence fosters both self-awareness and social connection, creating an environment where knowledge sharing feels safe and affirming. However, regulatory structures often constrain the full expression of emotional intelligence, resulting in suppressed authenticity.

4.2 Communication

Communication functions as the conduit for knowledge exchange, influenced by both the speaker's articulation and the listener's capacity to absorb information. Effective communication necessitates emotional intelligence, cognitive awareness, and contextual adaptability. Challenges arise from jargon-laden discourse, disparities in ICT skills, and individual communication preferences. Informal channels (e.g., corridor conversations) are deemed essential for sharing tacit knowledge. Participants observed that when mutual understanding is absent, messages may be misinterpreted or rejected, thereby inhibiting collaborative learning.

4.3 Regulatory Demands

Increased regulation restricts autonomy and impedes the sharing of tacit knowledge. Participants expressed apprehension about "stepping outside their lane," with concerns regarding GDPR, liability, and disciplinary action stifling open communication. Protocols prioritize compliance over innovation, diminishing employees' willingness to offer assistance or ideas. While regulation ensures safety and standardization, it paradoxically undermines the very ethos of care that many participants aspire to uphold. This creates tension between policy adherence and human connection.

4.4 Hierarchy

Perceptions of hierarchy strongly influence KS intentions and behaviour within this community-based service provider. Hierarchy is seen as both necessary for regulatory control and problematic when it inhibits employee interaction. Participants describe "silo mentalities" in which disciplines protect their domains, thereby stifling cross-disciplinary knowledge engagement. Participants report feeling dismissed or undervalued based on their tenure, discipline, or education, which can lead to a perceived sense of ostracism. One participant recounted having their academic input rejected. Another participant observes, "they'd walk over a basic grade person to go to a principal," signalling a lack of respect across roles. This "pulling rank" approach discourages open dialogue and reduces KS. Conversely, participants expressed hope for change, citing improved connection and leadership efforts. Still, many recognise that hierarchy remains a barrier to fulfilling needs like autonomy and relatedness.

4.5 Relationships

Relationships are fundamental to effective knowledge sharing. Participants emphasised that mutual respect, trust, and a sense of belonging facilitate the exchange of tacit knowledge and soft skills. However, fluctuating team dynamics, staff turnover, and hybrid work models impede the development of deep connections. The presence of hierarchical thinking and cross-disciplinary misunderstandings exacerbates this issue. Nonetheless, participants expressed a desire for meaningful work relationships and communities of practice, where sharing becomes an organic and collaborative process. Emotional codes such as 'regret' and 'hope' reveal the emotional labour underpinning workplace relationships.

4.6 Professional Identity

Professional identity significantly influences individuals' perceptions of their roles and their propensity to share knowledge. Some participants encountered difficulties in articulating their roles due to ambiguous or misunderstood professional boundaries, while others experienced a lack of confidence or external validation. Age, experience, and educational background play crucial roles in shaping a professional identity, which can occasionally result in power dynamics. A secure professional identity promotes openness, whereas ambiguity may lead to withdrawal. Barriers related to identity intersect with hierarchy, tenure, and perceptions of leadership, often reinforcing knowledge silos.

4.7 Information and Communication Technology (ICT)

The rapid transition to ICT prompted by the pandemic disrupted traditional methods of knowledge sharing. Platforms such as Zoom, webinars, and WhatsApp supplanted informal conversations, yet many participants perceived these tools as impersonal and less effective. Younger staff adapted swiftly, whereas older employees faced challenges with digital literacy, exacerbating generational divides. ICT emerged as both a necessity and a barrier, particularly for sharing tacit knowledge, which depends on relational cues and unstructured dialogues. Digital tools alone cannot replicate the richness of in-person interactions.

4.8 Tenure

Tenure exerts a complex influence on KS intentions and behaviour. Long-serving employees often exhibit resistance to new ideas, as illustrated by a dismissive response to a newcomer's suggestion: "You've been here five minutes." This fosters an "us vs. them" mindset and reinforces cultural silos. While tenure can instil the emotion of confidence and pride, it also risks internalised ageism and discomfort with evolving new technologies. For new staff, enthusiasm and a desire to belong drive KS. Tenure also intersects with competence and organisational commitment, with experienced staff often regarded as repositories of valuable knowledge. However, hierarchical constraints and fear of overstepping roles limit open exchange.

4.9 Leadership

Leadership plays a pivotal role in cultivating a culture that promotes KS. Supportive leaders who model openness and empathy foster a sense of psychological safety. Participants appreciated when leaders acknowledged emotional and cognitive needs, offering intuitive and compassionate responses. However, a perceived disconnect between management and frontline staff, exacerbated by hybrid models, limited relational interaction. Leadership that prioritises targets over people can unintentionally silence voices and weaken relational cohesion, thereby impacting the flow of knowledge.

4.10 Organisational Challenges

Post-pandemic realities have reshaped workplace dynamics. Hybrid models have reduced face-to-face interaction, and ICT overload has eroded relational depth, diminishing KS intentions and behaviour, particularly knowledge that comes from the tacit dimension. Staff turnover disrupts continuity, complicating the building of relatedness within the organisation. Regulatory pressures and systemic challenges, such as the cost of living, compound the problem, affecting morale and motivation for KS. Many participants expressed nostalgia for the pre-pandemic informality and frustration with the current constraints, highlighted by an increase in regulatory demands, underscoring the impact of systemic forces on interpersonal exchanges.

4.11 Education

Education serves as a dual-faceted instrument. While it can bolster confidence, pride and competence, it may also incite feelings of resentment or exclusion. Participants possessing academic qualifications reported experiencing isolation. Responses such as "put up or shut up" discouraged further KS contributions. Conversely, experiential knowledge was occasionally prioritised over formal education, leading to demographic divides. One participant discusses how "young staff members" have degrees yet are only at the "L plate level" of understanding the care of others. Additionally, there is a sense that specific disciplines use "fancy words," which limits interactions between disciplines, as those workers "wouldn't necessarily speak that language."

4.12 Organisational Commitment

Commitment to the organisation enhances knowledge-sharing behaviours. Employees who feel valued, empowered, and connected are more likely to support one another and invest in the collective success of the organisation. Recognition, positive feedback, and alignment with the organisation's mission contribute to this sense of commitment. However, high turnover, rigid structures, and hierarchical barriers diminish emotional investment. When staff perceive that their contributions are neither acknowledged nor appreciated, their commitment and, consequently, their willingness to share knowledge, decline.

5. Conclusion

This paper advances RTA research by incorporating three well-established coding practices: emotion coding, values coding and In-vivo coding into a coding family. This coding family improves the rigour and trustworthiness of RTA coding practices by providing insight into how analysts can generate reflexive codes. Additionally, through conducting, in particular, emotion and values coding, this research believes that it will reduce the ambiguity surrounding Braun and Clarke's apparent frustration and alleviate their feelings of "we were wrong" in their discussions of how to conduct RTA coding (Braun, Clarke and Hayfield, 2022, p.428). This paper demonstrates the real value of the dynamic constructs of the axial connections created from 'the coding family'. In doing so, the research can provide greater depth of understanding of the KS intentions and behaviours of the employees within this community-based service provider. The method demonstrated in this paper offers a solid foundational practice that brings value to understanding the ecosystem of an organisation by providing meaningful insights into data related to KS.

Ethics Declaration

Ethical approval for this study was obtained from TU Dublin, Research Ethics Committee, ensuring that all procedures complied with established ethical standards

AI Declaration

Paperpal was used the same way as Grammarly—just to check sentence structure. No AI was used for any information produced or in the research outcomes.

Informed Consent

Informed consent was obtained from all participants, who were fully briefed on the purpose, procedures, risks, and their right to withdraw from the study at any time without penalty.

Declaration of Conflicts of Interest

The authors declare that there are no known conflicts of interest regarding the research, authorship, and/or publication of this article.

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A Methodological Approach for a Hospitality Industry-University Business Model Innovation Collaboration

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Abstract: Progressive hospitality organisations are constantly tested to grow market share through value propositions that appeal to multifaceted tourist behaviours, cognisant of organisational limitations, established operational practices and the organisational culture of employees. This search for sustainable competitive advantage has been challenged by increased global competition, intensification in technological progress, changes in consumer behaviours and exacerbated by recent crises such as COVID 19. In response, hospitality management scholars increasingly call upon Business Model Innovation (BMI) insights to assist detailed exploration of market realities and question established beliefs and practices. Specifically, the BMI concept requires organisations to engage cognitive processes to ensure strategic and entrepreneurial reasoning can be applied to create, capture and disseminate value following an input-output logic of its activities. This research explores the creation and development of a university-industry BMI hospitality focused lab in Türkiye. Specifically, it explores how emerging scholarly BMI research can be applied to ensure hospitality professionals effect value creation, value capture and delivery for their organisations based on the creation and application of a methodological approach to BMI canvas design. This research considers how such a methodology incorporates a multidisciplinary perspective to a specific industry and geographical context to foster the knowledge, skills and competencies of industry practitioners. As BMI is an emerging research theme in hospitality scholarship, this research explores how universities can become trusted partners and engage industry with practical, credible and systematic BMI approaches to value creation. Specifically, it introduces the methodology employed in the development of a hospitality focused BMI Lab in Bursa Uludağ University Türkiye, as part of a Horizon Europe project with partners in Atlantic Technological University Ireland and Universidad de Leon Spain.

Key words: Business Model Innovation, Hospitality, Collaboration, Trust, Value Creation

1. Introduction

The hospitality industry thrives on delivering exceptional customer experiences. The sector, however, is also inherently vulnerable to external shocks such as economic downturns, natural disasters, and most recently, global pandemics (Breier et al., 2021). In the face of these challenges, Business Model Innovation (BMI) emerges as a crucial tool for survival, adaptation, and long-term growth (Foss and Saebi, 2017). BMI allows hospitality firms to proactively respond to evolving market dynamics, meet changing customer needs, and seize new opportunities by reconfiguring how they create, deliver, and capture value (Dressler and Paunović, 2021).

This research introduces the methodology employed in the creation of a university-hospitality industry collaborative BMI Lab at Bursa Uludağ University (BUU), Türkiye, in partnership with Atlantic Technological University (ATU), Ireland, and Universidad de Leon (ULE), Spain. While this study explores the multifaceted role of BMI in the hospitality industry, examining its drivers, types, impact on other innovations, and significance in navigating crises, it begins by exploring how universities can become trusted partners in academia-industry collaboration.

2. Universities as Trusted Partners in and Hospitality Industry Collaboration

Collaboration between universities and the hospitality industry is crucial for the growth and sustainability of both sectors (Caloghirou et al., 2001). Research suggests that while there is a growing recognition of the importance of university-industry collaboration in hospitality, the level of engagement varies significantly (Griffin, 2022) as the potential for mutual benefits may not be realised (Alonso and O'Neill, 2011).

For universities such collaboration can realise access to real-world data and industry insights to enhance research (Schoffstall et al., 2013; Varnavas and Soteriou, 2002) boosting the universities reputation and credibility through industry partnerships (Caloghirou et al., 2001). For the hospitality industry, collaboration

provides access to cutting-edge research and innovative solutions to address industry challenges (Perkmann et al., 2021) and improves the recruitment pipeline (Alonso and O'Neill, 2011). Industry partners can also improve their brand image and reputation through association with reputable academic institutions (Tesone and Ricci, 2005).

Despite the potential benefits, several barriers hinder effective university-industry collaboration in the hospitality sector. Hospitality operators, particularly small organisations, often lack awareness of the potential ways universities can assist their businesses (Griffin, 2022). This can be compounded by miscommunication and a lack of understanding of each other's needs and priorities, thereby creating obstacles to collaboration. Small hospitality enterprises may also face resource constraints that limit their ability to engage in partnerships with universities (Nguyen and Nguyen, 2020). Crucially research suggests that a clear barrier to university-hospitality collaboration is the absence of trust between partners (Griffin, 2022). Building trust between universities and industry partners takes time and effort, and requires transparency, open communication, and a commitment to mutual benefit (Rybnicek and Königsgruber, 2019), therefore this study focuses on alleviating the barriers of risk to develop trust-based relationships between collaborators.

While researchers debate a universally accepted definition of trust, studies suggest that trust is the anthesis of risk (Williams and Baláž, 2020). As trust is a psychological perception that an actors vulnerabilities will be reduced on the basis of positive expectations (Williams and Baláž, 2020), universities can become trusted collaboration partners by ensuring they adhere to common indicators of trustworthiness; Ability, Benevolence and Integrity (Mayer et al., 1995). *Ability* refers simply to the universities ability, and willingness, to do what they said they would do as credible knowledge sources and knowledge transfer partners (Becerra et al., 2008). *Benevolence* denotes an underpinning desire for the university to assist and support the collaborating partner and refrain from exercising episodic power in the relationship (Svare et al., 2020). Finally, *Integrity* describes the creation of a shared moral compass between trusting partners and denotes goodwill and joint common values (Weber et al., 2004). By establishing trust between partners, stronger university-industry collaborations can lead to the reimagination of existing operations and practices of a hotel based on BMI.

3. Defining Business Model Innovation in the Hospitality Context

A business model encompasses the logic and architecture of how a firm operates, outlining its value proposition, target market, key activities, resources, partnerships, and revenue streams (Souto, 2015). It represents the fundamental framework guiding a firm's operations and it's approach to creating and delivering value to customers. BMI, therefore, involves a significant change in two or more of these elements, leading to a new and improved configuration of how the firm functions and interacts with its ecosystem (Boons and Lüdeke-Freund, 2013; Gassmann et al., 2014). In the hospitality industry, BMI can manifest in various ways, such as developing new service offerings (Dressler and Paunović, 2021), altering pricing strategies (Presenza et al., 2019), product/service enhancements (Foss and Saebi, 2017), process optimisation (Breier et al., 2021) or marketing and sales innovation (Presenza et al., 2019). Equally studies note radical innovations such as new service development can occur (Cheah et al., 2018). These can include leveraging technology (Langvinienė and Daunoravičiūtė, 2015) or building strategic partnerships (Hjalager and Madsen, 2018) to introduction and use of disruptive technologies such as artificial intelligence, blockchain, or the Internet of Things (Bogers and Jensen, 2017), or the adoption of new business models such as platform-driven ecosystems to unlock new growth avenues (Cosenz and Bivona, 2021). The success of both incremental and radical innovations often hinges on the ability of the firm to align its business model with these innovations depending on the specific challenges and opportunities faced by the firm (Souto, 2015).

4. Drivers of Business Model Innovation in Hospitality

The impetus for BMI often arises from a combination of internal and external pressures that necessitate a strategic response. Key drivers of BMI in the hospitality industry include environmental turbulence, where unpredictable circumstances force firms to adapt swiftly to survive and maintain relevance (Presenza et al., 2019). Innovation can also occur due to changing customer needs in response to the rise of the experience economy, digitalisation, personalisation expectations, and sustainability concerns (Breier et al., 2021). BMI may also be employed to address external competitive pressure where there is the constant need to innovate and enhance value propositions (Langvinienė and Daunoravičiūtė, 2015). Internal pressures such as declining profitability or operational inefficiencies can also drive firms to seek new and improved ways of doing business to optimise performance and achieve financial sustainability (Boons and Lüdeke-Freund, 2013). It is essential to

recognise that these drivers often operate in tandem, creating a complex and dynamic landscape that requires a holistic and adaptive approach to BMI (Chesbrough, 2010).

5. Business Model Innovation as a Catalyst for Other Innovations

BMI can act as a catalyst for fostering a culture of innovation and driving other forms of innovation within the firm including a fundamental shift in the underlying logic and perception of what the business is, and how it operates (Souto, 2015). This transformation can lead to the creation of entirely new value propositions, target markets, and competitive positioning (Jang and Ardichvili, 2020). The relationship between the fundamental review of the business concept and BMI is symbiotic. A new business concept often necessitates a corresponding change in the business model to translate the new logic into operational reality (Teece, 2010). Conversely, the process of innovating the business model can lead to the realisation of inherent flaws or limitations in the existing business concept, prompting a reassessment and potential innovation at the conceptual level (Souto, 2015).

For example, in the hospitality industry, business concept innovation can manifest as shifting from product-centric to experience-centric offerings (Dressler and Paunović, 2021). Contemporary hotels are also embracing sustainability as a core value, thereby integrating environmentally friendly practices, ethical sourcing, and community engagement into the business model to attract conscientious consumers and generate positive social impact (Presenza et al., 2019). Implementing these conceptual shifts effectively often requires corresponding changes to the firm's business model, leading to a more profound and sustainable transformation (Jang and Ardichvili, 2020).

BMI can be used to build resilience and adaptability of hospitality businesses facing unforeseen challenges such as COVID-19 (Clauss et al., 2022). Hospitality firms that successfully implemented BMI during the pandemic evidenced agility and responsiveness by pivoting operations, adjusting service offerings, and implementing new safety protocols enabling them to meet changing customer needs and regulatory requirements (Breier et al., 2021). While BMI can support hotels through radical or incremental change in response to trends or crises, a key goal of this project necessitated the development of a trusted methodology for the BUU BMI Lab, therefore an adaptation of the established St Gallen Business Model Navigator (Gassmann et al., 2014) approach was adopted.

6. Academic Underpinning for BMI Lab Methodology

The St Gallen model pivots on a 'Magic Triangle' consisting of four dimensions which aims to provide a detailed understanding on the industry partners customer segments, value proposition, value chain and finally, revenue and profitability. By using such a model, the project design team aimed to enhance ability-based trust through communication and increased transparency between collaborators (Rybnicek and Königgruber, 2019) using a credible methodology backed by academic rigour (Nsanzumuhire and Groot, 2020).

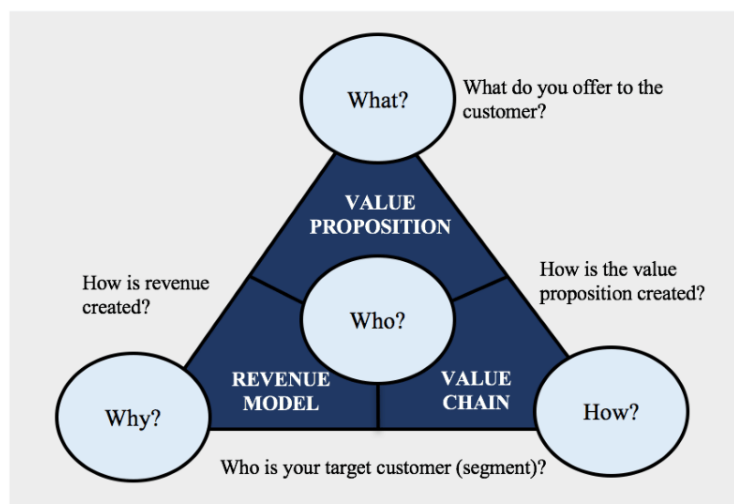


Figure 1: The magic triangle and the four dimensions of a BM (Gassmann, Frankenberger and Csik 2013)

The first dimension, Customer Segment (Who), requires clear identification of the target customers and definition of their needs, characteristics and behaviours. The second dimension, Value Proposition (What),

describes what products and services are offered to customers to firstly meet their needs, but secondly, ascertain the unique value or benefit that the business provides it's customers. The third dimension, Revenue Model (Why), explains how the business generates revenue and achieves financial viability by outlining revenue streams, pricing strategy and payment mechanisms. Based on Porters Value Chain Analysis, the final element, Value Chain (How), examines the processes, activities, competences, resources, channels and relationships with customers and partners required to deliver the value proposition. While the Business Model Triangle is a powerful means to explain the process of how to develop new business models, it remains conceptual necessitating a further tool to clearly collate and illustrate the organisations internal analysis (Reinhold et al., 2018). To bridge this gap, Osterwalder (2013) support the use of a Business Model Canvas (BMC).

7. Business Model Canvas

A BMC allows for the development of a diagrammatic representation on how an organisation creates, delivers and captures value by describing and structuring the key elements of a business model in nine interconnected blocks, see Fig 2. Based on an input-output model, the nine themes address the internal assets, customer segments and associated channels for each organisation, thereby capturing the unique context in which the hotels operate. Importantly, the BMC is forward not backward looking, and focuses on creating value from unearthing new or hidden customer needs, rather than benchmarking against competition (Osterwalder, 2013).

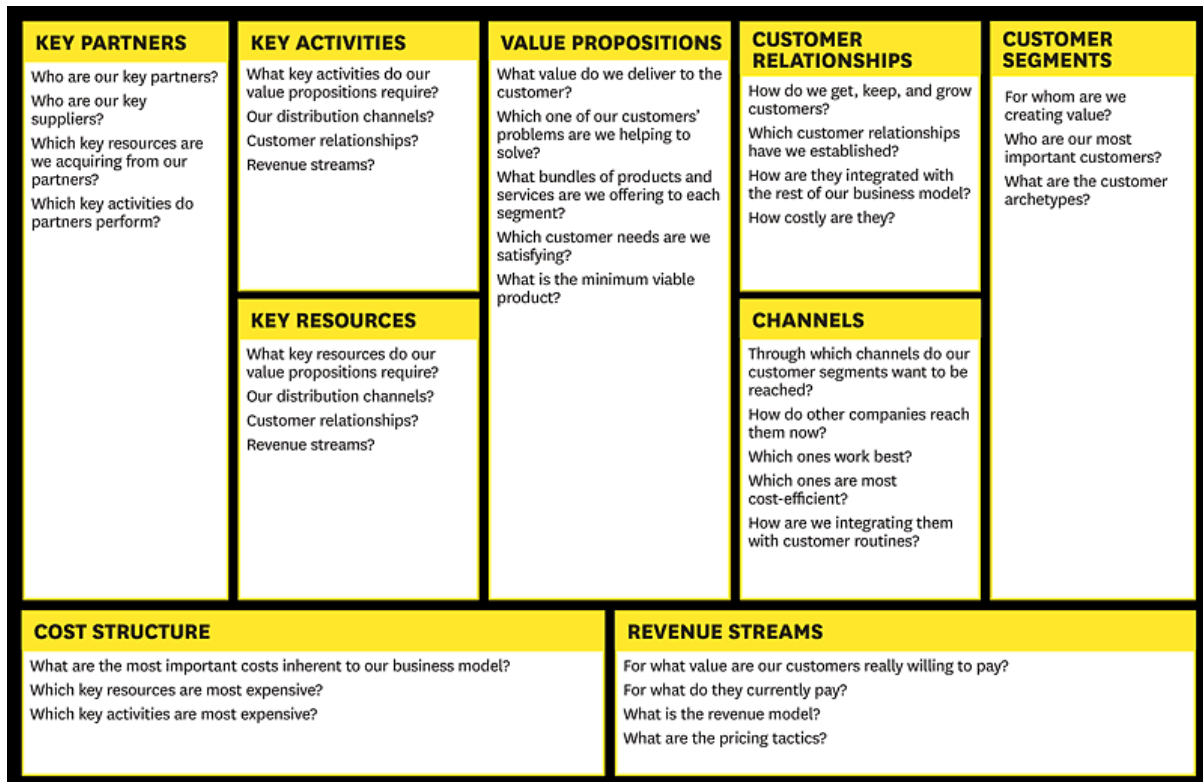


Figure 2: Sample Business Model Canvas (Osterwalder, 2013)

The BUU BMI Lab incorporated the BMC concept as the overall guiding framework to assess the coherence and effectiveness of an organisations existing business model, and uses the canvas to identify areas for improvement, innovation and cost optimisation (Foss and Saebi, 2017) under four distinct headings: Customers, Offering, Infrastructure and Finance.

The theme 'Customers' addresses three distinct yet inter-related elements: consumer segments, channels of distribution and customer relationships. Customer segmentation help to define the user experience of different groups of people or organisations an enterprise aims to reach and serve and typically includes mass market, niche market or markets segments e.g. geographical area, gender, age, interests and income and diversify (Keiningham et al., 2020). Channels describes how a company communicates (communication, distribution, and sales channels) with, and reaches, it's targeted customer segments to deliver a value proposition (Rachinger et al., 2018). Customer Relationships outline the types of relationships and interactions a company establishes with specific customer segments e.g. personal assistance, salespeople, self-service and online (Reinhold et al., 2018).

There are three key issues to be addressed: generating new customers, keeping existing customers and growing revenue from existing customers.

The second theme, Offering, refers specifically to the organisations value propositions which describes the products and services a business offers to meet the needs of, and create value for, a specific customer segment (Griffin, 2022). According to Osterwalder et al. (2015), https://en.wikipedia.org/wiki/Business_Model_Canvas a company's value proposition is what distinguishes it from its competitors. The value proposition therefore provides hotel guests value through various elements such as newness, performance, customisation, "getting the job done", design, brand/status, price, cost reduction, risk reduction, accessibility, and convenience/usability (Breier et al., 2021). Value propositions can be either quantitative (price and speed of service) or qualitative (customer experience or design) (Cheah et al., 2018).

The third theme, 'Infrastructure' or 'Value Chain' considers the most important activities needed to make the business model function cognisant of the inter-relationship between value proposition, service distribution channels, markets, customer relationships, and revenues (Hjalager and Madsen, 2018). This theme focuses hoteliers to create an efficient procurement and supply chain to achieve cost efficiency. To achieve this, key resources and partners are examined.

Key resources are necessary to create value for the customer and make the business model work. They are the assets that are needed to sustain and support the business including human, financial, physical and intellectual property (Andrianto et al., 2022). Resources and activities are inextricably linked, activities require resources to be delivered and underutilised resources are wasteful (Yang et al., 2017). Key partners must also be considered as they are the network of suppliers and partners that make the business model work. Companies create alliances to optimise their business models, reduce risk, or acquire resources (Hjalager and Madsen, 2018).

The final theme, Finances, focuses on revenue and costs. Revenue streams represent the value generated from selling hospitality products and services to each customer segment, thereby highlighting how customers will pay (Andrianto et al., 2022). A business model can involve two different types of revenue streams; transaction revenues resulting from one-time customer payments or recurring revenues resulting from ongoing payments to either deliver a value proposition to customers or provide post purchase customer support (Osterwalder et al., 2015). Finally, Cost structures are considered as they describe all costs, such as resources, activities and partners, incurred to operate a business model to deliver value propositions, create revenue streams, and maintaining customer relationships (Ambrož and Omerzel, 2017).

In summary, while tourism scholarship acknowledges the contribution of BMI to progressive hospitality organisations, the importance of integrating seminal and contemporary academic insights to illuminate how best to design the methodological approach for the BUU BMI Lab necessitated the merging and reconceptualisation of trusted previous insights to create a bespoke approach.

8. The BUU BMI Lab Methodology employed

A key requirement in the construction of the BUU BMI Canvas was to ensure it acts as an iterative process, involving the initial building, questioning, refining, and improving of the BMI Canvas. Based on previous studies, key steps were developed: Set the context; Construct the canvas; Analyse and evaluate; Optimise and iterate; and Implementation and monitoring. To this end, the BUU BMI Lab created context and sectoral specific eight-step methodology to analyse and innovate the business model, see Fig 3.

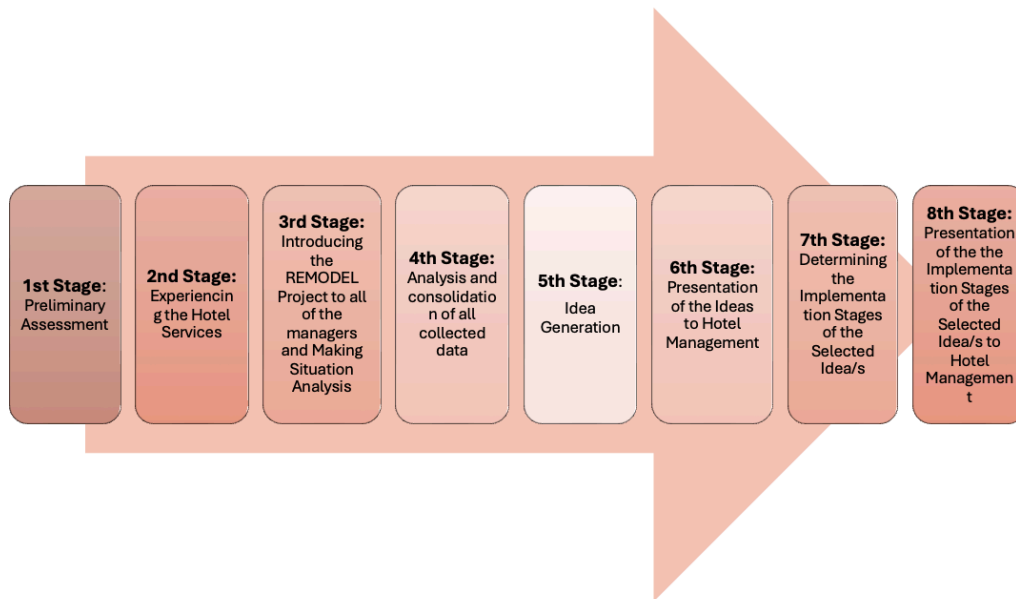


Figure 3: BUU BMI Lab Eight Stage Methodology

The aim of the first stage, Preliminary Assessment, is to analyse the general profile of the hotel and competitors based on completing tasks such as conducting reviews of the hotel's website and social media accounts. Triangulation of online presence is complemented by an internal analysis of comments and complaints via platforms such as Google and TripAdvisor and external assessment of key competitors. Stage two necessitates a visitation to the hotel by BUU BMI Lab staff to experience one-night's accommodation and record their observations by means of a service blueprint and thereby empathise and further understand the customer journey through key stages.

Stage three begins by introducing the REMODEL Project and BUU BMI Lab Methodology to the hotel's management team and presenting initial insights regarding the properties Situation Analysis and collecting feedback. Crucially, this stage aims to build role and category-based trust (Kramer, 1999) between collaborators. Here BUU as the university partner (Category-based trust) and the BMI Lab team as lecturers and researchers (Role-based trust) facilitates development of sufficient social capital (Martínez-Pérez et al., 2016) between industry and academia for all parties to be deemed competent and develop integrity-based trusting relationships (Chen et al., 2017). Such trust allows for development of an understanding of the expectations of the managers and mutual agreement when determining the work schedule. A second aim of this step is to collectively conduct a comprehensive Situation analysis. This is achieved through collection of qualitative data for SWOT analysis which contributes to the BMC.

Stage four requires analysis and consolidation of all collected data aims to consolidate necessary BMI tools to include visualisations of SWOT analysis, Value Proposition and BMC. The fifth stage, Idea Generation, aims to generate innovative/transformational ideas based on the data analysed. Key tasks during this fifth stage include brainstorming to generate innovative/transformational ideas, placement of ideas in the Innovation Matrix and evaluation of ideas.

Based on the graphic representations of above, the sixth stage focuses on developing implementable actions for the property. Following regular meetings and communication, academic credibility emerges, encouraging shared understanding and mutual support bonds between academia and practitioners. Mimicking Kelliher et al.'s (2018) insights on bridging, building and bonding, trust emerges as a key asset at this critical phase. Here the key aim is for BMI Lab members to employ these established trust-ties with hotel partners and support them to conceptualise and debate alternative visions of their organisation's business model. Importantly, this stage encourages the hotel to consider the positive effects of each potential option and based on data and feedback from within the management team, a shared short-listing of the alternative ideas emerges.

Stage seven, Implementation, tasks the hotel management team, with the support of the BMI Lab team, to define the elements that need to be changed or transformed in the hotel to implement the selected ideas. Finally, stage eight, Presentation, requires the collective hotel management team to present and explain the

implementation stages of the proposed BMC with accompanying evaluation of the implementation stages with senior hotel management and owner, where appropriate.

9. Pilot Test: Tools, Techniques and Frameworks Used in Data Collection

As the BUU BMI Lab team endeavoured to become trusted partners during the eight-stage process innovation process, it was deemed necessary to conduct a pilot of the methodology with three test case properties to ascertain the desirability, feasibility, viability and sustainability of the methodology (Hjalager and Madsen, 2018). Three properties were recruited based on such variables as location, scale, rating and ownership model, see Table 1.

Table 1: Overview of properties chosen for pilot

	Ownership	Location	Number Rooms	Hotel Type	Target Segment	Current Performance	Current Challenges
Hotel A	Family owned	Mountain Region of Bursa called Uludağ (40 km from Bursa city centre)	66	4 Star	Families Business	Low	Fluctuating demand (Demand is high in winter)
Hotel B	Family owned	Town of Bursa called Keles (50 km from Bursa city centre)	11	3 Star	Families	Low	Fluctuating demand (Demand is irregular in whole year)
Hotel C	Family owned	Centre of Bursa City	70	3 Star	Families Business	Low	Adopting low-price competition strategy

Acknowledging that BMI concepts and canvases are not commonly used aids to business analysis and planning by hotels in the region, the BMI Lab team developed supporting tools, techniques and frameworks that can be used to assist building and development of a BMI Canvas. Such supports were deemed necessary as studies suggest that collaborating industry partners typically lack the tacit knowledge to actively contribute to the BMI design process (Cavusgil et al., 2003). Equally, while the overarching concept may be novel, key to the development of a revised BMI dictated that industry partners were comfortable and competent in utilising established tools and frameworks required to gather robust data by using, for example, interviews, observation and surveys. Such tools were contextually designed to facilitate communication and development of visualisations, collaboration and internalisation of processes (Souto, 2015). The following section overviews three such tools and accompanying rationale for each stage of the collaboration.

9.1 General Business Background and External Environment questionnaire

Firstly, the overall external context that the business operates is explored, specifically the external factors that impact the BMI canvas. Such data pertains to market forces, social trends, competitors and relative competitive advantage, the macroeconomic and political context of the business. These insights are collated using the BUU BMI Lab ‘General Business Background and External Environment’ questionnaire. Consisting of nine sections, over ninety questions address such themes as consumer segments, channels, customer relationships, value proposition, key activities, key resources, key partners (excluding customers), revenue streams and cost structures. The questionnaire is used for two clear purposes. Firstly, the questionnaire acts as a data gathering tool but importantly, a second benefit of completion, is the assessment of internal cohesion within the existing management team. Prompts are provided for each question to facilitate internal and external communication, see for example Figure 4.



2. Channels

Some questions that will consider possible channels (communication, distribution, and sales channels) – all events that try to reach the target audience and promote the hotel services e.g., rooms, conferences, restaurants.

<p>Q18 What channels do you use to serve your customers?</p> <p>For example:</p> <ul style="list-style-type: none"> • Traditional advertising e.g. radio/television, print, and radio, to reach its target customers. • Online marketing. The nature and quality of online presence well-designed website and social media accounts uses search engine optimization. • Public relations. Uses public relations to generate positive media coverage and build brand awareness and sales campaigns. • Loyalty program e.g., free nights, room upgrades, and discounts

Figure 4: Sample question from ‘General Business Background and External Environment’ questionnaire

Where required, the BUU BMI Lab team aim to facilitate data collection and debate among industry partners by using context specific prompt cards when addressing specific topics. For example, when conducting external analysis, cards overviewing industry trends and sources of disruption are available to assist collation of degree of importance and responsiveness to contextual themes and challenges faced by industry practitioners, see Figure 5.

Trend card prompts		
TRENDS	<p>Digital Transformation</p> <p>Description: Integration of digital technology, including mobile apps and self-check-in kiosks, to streamline operations and enhance customer experience.</p> <p>Impact: Improved guest convenience, remote check-in/out, and access to hotel services.</p>	TRENDS
TRENDS	<p>Robotics</p> <p>Description: Utilization of robotics to address ongoing staff shortages in hotel operations, performing tasks such as cleaning, room service, and cooking.</p> <p>Impact: Increased operational efficiency and improved guest services.</p>	TRENDS
TRENDS	<p>Sustainability</p> <p>Description: Adoption of eco-friendly practices in hotels and restaurants, including the use of renewable energy, reducing food waste, and minimizing single-use plastics.</p> <p>Impact: Reduced carbon footprint and enhanced environmental responsibility advantage?</p>	TRENDS
Disruption card prompts		
DISRUPTION	<p>Unexpected Global Event</p> <p>Scenario: A sudden global event significantly impacts travel and tourism.</p> <p>Challenge: Respond to the crisis and adapt your business model to the new normal.</p> <p>Questions to Consider: How can you reassure customers and ensure their safety during uncertain times? How can you enhance customer loyalty and prevent migration to the new entrant?</p>	DISRUPTION
DISRUPTION	<p>Competitor Disruption</p> <p>Scenario: A major competitor enters your market with a disruptive innovation.</p> <p>Challenge: Differentiate your business and stay competitive.</p> <p>Questions to Consider: What unique value proposition can set you apart from the new competitor? How can you enhance customer loyalty and prevent migration to the new entrant?</p>	DISRUPTION
DISRUPTION	<p>Natural Disaster Response</p> <p>Scenario: Your business faces the aftermath of a natural disaster.</p> <p>Challenge: Rebuild and reshape your business model.</p> <p>Questions to Consider: How can your business contribute to recovery efforts? What adjustments are needed to address changes in local infrastructure and demand?</p>	DISRUPTION

Figure 5: Sample prompt cards

9.2 Persona Profiles

To assist further understanding of each segment, particularly their needs and wishes, the hotel team are obliged to create a persona profile for each customer segment. The use of such personas is established in tourism and hospitality research for three main reasons. Firstly, each persona acts as the embodiment of a distinct segment, secondly, the persona sets expectations of the company from that segment and finally the persona informs the qualities and values of the firm that resonate positively with the consumer segment (Dion and Arnould, 2016).

9.3 Value Proposition Canvas

To examine how the products and services offered meet the needs of the target customer segment, the BUU BMI Lab Questionnaire includes appropriate questions related to targeted segments with accompanying Ecosystem Analysis exploring stakeholders in product and service provision. Such data can be visualised via a Value Proposition Canvas, see figure 6, to ensure hotels attune their offer to the wishes and needs of their identified segments and completed customer persona profiles.

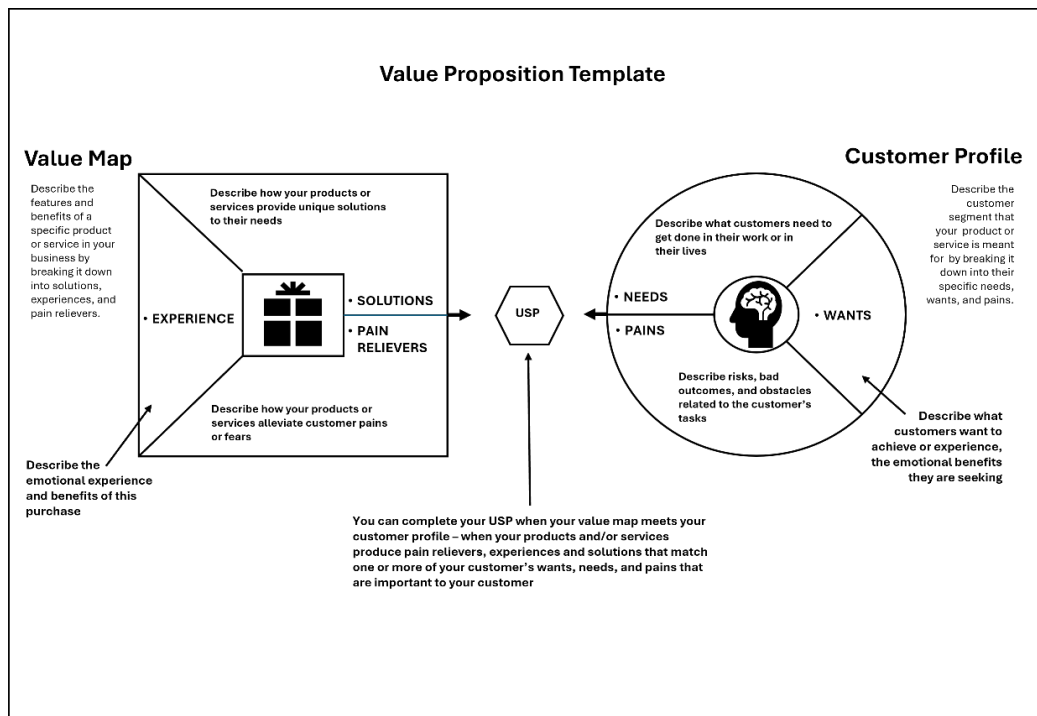


Figure 6: Value Proposition Template (Source: (Osterwalder et al., 2015))

This value chain explores how the product or service is delivered and considers the value proposition created. Such insights are also considered in the BUU BMI Lab Questionnaire with sections and questions specifically examining the processes, activities, resources and competences required to deliver the products or services.

By using such tools, frameworks and prompts to explore and understand each hotel, the BMI Lab methodology aims to encourage ability and benevolence-based trust (Mayer et al., 1995) and become a trusted partner, able to conduct themselves in a supportive manner, constantly empathising with challenges and constraints faced the hotel management team. Culmutavely the supports and methodology contribute to the preperation of a SWOT analysis, and BMC identifying the revised BMI, with accompanying reflective evaluation defining the problems, challenges and opportunities presented. In summary, by developing the BMI Lab methodology in a scientifically structured manner, and through the use of suitable tools and frameworks to support the creation of a BMC that adequately captures and visualises both the context and intent of each unique hotel, BUU become trusted, credible and respected partners in academia-industry collaborations.

10. The Future of Business Model Innovation in Hospitality

The dynamic nature of the hospitality industry, accelerating technological advancements, evolving consumer expectations, and the increasing importance of sustainability, suggests BMI can address emerging trends shaping the future of hospitality (Souto, 2015). Firstly, personalisation through data-driven guest preference insights to

create hyper-personalised experiences tailored to individual needs is increasingly an expectation (Ibrahim and Islam, 2024). Secondly, hotel operations are increasingly impacted by the rise of the sharing economy where integrating platform-based services and peer-to-peer interactions create new value propositions and revenue streams (Sánchez-Pérez et al., 2021). Thirdly, as hotels increasingly consider sustainability a core value, the BMI must go beyond compliance and embrace sustainability as a core value proposition that attracts environmentally conscious consumers (Presenza et al., 2019). Finally, as traditional boundaries of hospitality become blurred, the BMI must consider inputs from such entities as technology providers and experience designers to create innovative offerings (Souto, 2015). To thrive in this evolving landscape, hospitality firms must adopt a proactive approach to BMI, fostering a culture of innovation, experimentation, and leveraging data-driven insights to anticipate and respond to emerging trends.

11. Conclusion

Business model innovation is not simply a strategic option for hospitality businesses; it is an imperative for survival, adaptation, and sustainable growth. The ability to reconfigure how value is created, delivered, and captured enables firms to navigate turbulent environments, meet changing customer needs, and seize new opportunities. By embracing a holistic and continuous approach to BMI, fostering a culture of innovation, and prioritising customer-centricity, hospitality businesses can enhance their resilience, competitiveness, and ability to thrive in an ever-evolving market. While hotels can address the challenges of BMI independent of external support, universities as regional and sectoral partners, are increasingly recognised as facilitators and enablers of change. Therefore, the narrative of the entrepreneurial university embraces the challenge of ensuring sectoral partners engage in innovative strategic planning practices thereby encouraging sustainable economic growth in their regions.

By embedding trust-based relationships between industry practitioners and university-academic partners, this research presents a comprehensive methodology for navigating the turbulent BMI process that is both objectively introspective and ambitiously entrepreneurial by nature. The approach recognises that ability, benevolence and integrity-based trust facilitates deconstruction and analysis of all constituent elements of the hotels internal and external environment for the purpose of redefining how the property creates value for existing and potential customers.

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Ethics Declaration

Ethical approval for this study was obtained from Atlantic Technological University

AI Declaration

No AI tool or technology was used in this study

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Impact of Risk Assessment and Monitoring on the Operational Efficiency of Microfinance Banks

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Abstract: This study investigates the effect of risk assessment and monitoring systems on the operational efficiency of microfinance banks (MFBs) in Nigeria. It addressed some of the key challenges, including inefficiencies, non-performing loans, and fraud that hamper corporate sustainability and growth. A sample of ninety-nine (99) microfinance managers across diverse departments, including risk management, operations, and audit, were surveyed. Data were collected using structured questionnaire and data analysis was informed by the Committee of Sponsoring Organizations of the Treadway Commission Framework (COSO), which identified two out of the five critical components of internal control: risk assessment, and monitoring (independent variables). A quantitative research methodology was used, and the data were analysed using multiple-regression analysis with SPSS 30 to examine the relationship between these components and operational efficiency. Findings suggest that risk assessment and internal control monitoring significantly enhance operational efficiency. However, the models demonstrate a low overall R-squared value which suggest additional variables may affect operational outcomes which further highlights the need for investing in technology-driven, tailored control systems and fostering ethical practices which are key challenges faced by the microfinance banks in Nigeria. The findings further suggest that thorough and robust internal control systems are vital for improving efficiency, building confidence, and strengthening organizational structures. This study contributes to the extant literature on financial inclusion, institutional sustainability, and internal controls, offering practical guidelines for financial institutions desiring to improve their operations. Importantly, strengthening risk assessment enhances financial performance and governance, which helps to reinforce the necessity for regulatory improvements in microfinance banking.

Keywords: Microfinance Institutions, Risk Assessment, Internal Control Monitoring, Operational Efficiency, COSO Framework, Financial Performance

1. Background to the Study

Microfinance banks (MFBs) play a crucial role in promoting financial inclusion, providing credit and financial services to low- and middle-class populations. However, many microfinance banks in Nigeria have collapsed due to weak internal controls, specifically in risk assessment and monitoring (CBN, 2021).

The microfinance banks in Nigeria have had their share of operational problems in the financial institutions. Although there have been regulatory measures and many changes in the system, the sector remains frail and vulnerable to inefficiencies and losses. Several Nigerian microfinance institutions failed due to poor risk assessment frameworks, weak monitoring, and financial mismanagement (Ndulue, 2020). Strengthening risk assessment and monitoring is therefore essential. These vulnerabilities were the main reasons behind the introduction of the Sarbanes Oxley Act, under which management must be held accountable for the internal control systems over financial reporting and for evaluating such systems. Some authors have stated that these shortcomings should be tackled using internal control mechanisms to improve the robustness of the financial systems and thus support sustainability.

Risk assessment and monitoring are part of internal control mechanism. Internal control is a systematic process implemented by an entity to manage risks, safeguard assets, enhance operational efficiency and ensure an organization's objectives are met (Purba et al., 2024). It provides assurance regarding financial reliability, regulatory compliance and overall corporate governance. Internal control consists of policies, procedures and monitoring mechanisms that ensure an organization's operations align with strategic objectives set by the management and the board of directors (Handoyo & Bayunitri, 2021).

Prior research highlights the importance of internal control in reducing financial risks, preventing fraud, and enhancing corporate accountability (Ndulue 2020). Effective risk assessment and monitoring systems play a crucial role in detecting irregularities, improving financial oversight, and ensuring sustainability in financial institutions. However, despite extensive research on internal control systems, studies on their specific application in microfinance banks remain limited.

Extant research on internal controls focuses on commercial banks, largely overlooking the unique risk exposure of microfinance institutions. Alade et al (2021) examined risk assessment frameworks in Nigerian financial

institutions but generalized their findings across all banking sectors, without addressing the distinct challenges of the microfinance banks. Unlike commercial banks, they serve low-income borrowers, face higher loan defaults, operate under weaker regulatory oversight, and have less access to advanced risk-mitigation technologies (CBN, 2021).

While prior studies acknowledge the role of internal control in financial stability, they often combine multiple internal control components, making it complicated and difficult to isolate the specific impact of risk assessment and monitoring. Given the high-risk nature of microfinance banking, understanding the role of these two components is crucial for improving operational efficiency and financial sustainability.

This study addresses the identified research gap and focuses exclusively on risk assessment and monitoring mechanisms and operational efficiency within Nigerian Microfinance banks. Unlike previous research that generalizes internal control systems, this study aims to provide targeted insights into how these two critical components influence operational efficiency, financial performance and regulatory compliance. By examining real-world applications of risk assessment and monitoring in microfinance banks, this study will contribute to policy recommendations and institutional strategies aimed at enhancing microfinance sector stability.

1.1 Research Aim

This study aims to evaluate the effect of risk assessment and monitoring mechanisms on the operational efficiency of microfinance banks in Nigeria.

1.2 Research Objectives

The specific objectives are:

1. To Assess the impact of risk assessment practices on the operational efficiency of microfinance banks.
2. To analyze the impact of monitoring mechanisms on the operational efficiency of microfinance banks.

1.3 Research Questions

This study intends to address the following research questions considering the above objectives.

1. How does risk management influence operational efficiency in microfinance banks?
2. How do monitoring mechanisms impact the operational efficiency in microfinance banks?

1.4 Review of Extant Literature

Internal control systems play a crucial role in financial institutions by ensuring operational efficiency, risk mitigation, and regulatory compliance. Among the core components of internal control, risk assessment and monitoring are particularly essential in preventing financial mismanagement and fraud (Feng et al., 2015).

2. Risk Assessment and Its Role in Operational Efficiency

Risk assessment involves identifying, analyzing, and responding to potential risks that could affect an organization's ability to achieve its objectives (Mulyandani, 2022). Effective risk management ensures that financial institutions anticipate threats and implement strategies to mitigate them, ultimately improving operational efficiency (Al Khansac & Violita, 2023).

Monitoring, on the other hand, ensures that internal controls remain effective over time. It involves ongoing reviews and evaluations to ensure compliance with regulations, detect inefficiencies, and correct control weaknesses (Chen et al., 2020). Financial institutions that lack proper monitoring mechanisms are more susceptible to fraud, operational disruptions, and regulatory penalties (Mjaku, 2019).

In the context of microfinance banks, weak risk assessment and monitoring systems have been linked to high default rates, financial losses, and regulatory non-compliance (Oyedokun & Felejaye, 2021). Given that microfinance banks operate in dynamic and high-risk environments, the ability to identify risks and implement continuous monitoring mechanisms is critical for their sustainability (Kabuye et al., 2019).

Despite extensive research on internal controls, most studies have focused on commercial banks, leaving a gap in understanding how risk assessment and monitoring impact operational efficiency in Nigerian microfinance banks (Kioko & Wambugu, 2017; Noah, 2018). This study aims to address this gap by assessing the effectiveness of risk assessment and monitoring in enhancing operational efficiency in Nigerian microfinance banks.

2.1 Theoretical Framework

To understand the relationship between risk assessment, monitoring, and operational efficiency. The agency and contingency theories are employed to help explain the relationship between internal control components (risk assessment and monitoring) and operational efficiency.

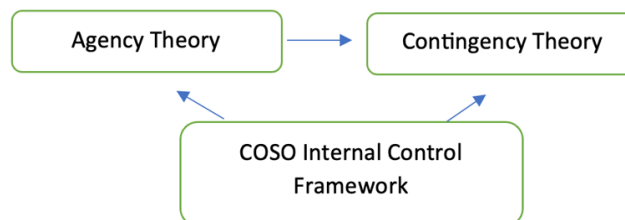


Figure 1: Theoretical Framework

2.1.1 Agency Theory

Agency Theory is a theoretical model that explains the principal-agent relationship, wherein the principal has the agent perform tasks that the principal cannot or will not do himself. As mentioned earlier, the principal and the agent are assumed to be self-interested parties. Vitolla et al (2020) state that companies have the economic motivation to make disclosures about internal controls irrespective of the Sarbanes-Oxley Act (SOX).

2.1.2 Contingency Theory

Contingency theory can be used to explain organisational behaviour since it helps understand how aspects like technology, culture and environmental factors influence the structure and performance of organisations (Otley, 2016). The study's findings reveal that no one-size-fits-all organisational structure guarantees effective performance; instead, an organisation's performance depends on technology compatibility, environmental uncertainty, size, structural characteristics, and information systems.

Thus, the combined knowledge of the agency and contingency theories sheds a deeper light on risk assessment and monitoring.

2.1.3 Analysis of Internal Control Framework

The COSO Internal Control Framework (2013) provides a structured approach to risk management and internal control. The framework consists of five key components: control environment, risk assessment, control activities, information and communication and monitoring.

This study focuses on two key components, risk assessment and monitoring which are related to operational efficiency in financial institutions. The COSO framework emphasizes that microfinance banks with strong risk assessment and monitoring mechanisms are better equipped to prevent financial losses and improve overall efficiency.



Figure 2: The COSO Cube: Internal Control – Integrated COSO Framework

Source: Setyawan et al. (2021)

2.2 Conceptual Framework

The conceptual framework illustrates the relationship between risk assessment and monitoring (independent variables) and operational efficiency (dependent variable).

2.3 Internal Control

Internal control is a system put in place by the board of directors, management, and other employees to achieve the organisation’s operations, reporting, and compliance objectives. This definition captures the main concepts of internal control, designed to achieve objectives in the three main areas: effective operations, reporting and compliance (Feng et al., 2015). In addition, Internal control includes both the administrative and the accounting aspects. These administrative controls include the structure of an organisation, the reporting channels, and the systems used to manage and set operations. As for internal control, the auditing committee defines it as an all-encompassing system of financial and non-financial accounting mechanisms developed by management to maintain business order, ensure adherence to policies and standards, and provide accurate record keeping (Ogunwale & Areghan, 2024). This study shows that internal controls are essential for organisations to attain their goals. Specifically, the COSO Framework helps improve the internal control systems by enhancing governance and performance. One of the most important factors in enhancing internal control is developing employees’ sense of responsibility in managing public resources.

2.4 Conceptual Framework

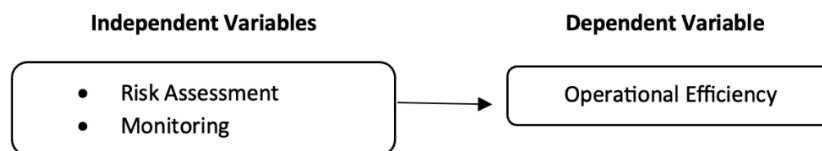


Figure 3: Conceptual Framework showing the relationship between independent and dependent variables.

2.5 Statement of Hypothesis

The following are the hypotheses for the study:

H1: Risk management practices positively influence the operational efficiency of financial institutions.

H2: Effective monitoring mechanisms have a positive impact on the operational efficiency of financial institutions.

2.6 Prior Research and Gaps

Table 1: Prior Research and gaps

Researcher	Focus	Results	Research Gaps	Current Study Focus
Otoo, Peprah-Amankona, and Andzie (2021)	Internal control and performance of universal banks in Ghana	Institutional performance improves with risk identification and mitigation.	Does not focus on microfinance institutions.	Focuses on risk assessment and monitoring in microfinance banks.
Kioko and Wambugu (2017)	Internal controls and firm value in Nairobi Stock Exchange companies	Risk assessment improves firm value.	Minimal impact of monitoring analysed.	Evaluates both risk assessment and monitoring on operational efficiency
Kyle and Mutua (2018)	Internal control and profitability in financial institutions in Nairobi County	Risk assessment and internal audit contribute to profitability.	Does not cover microfinance banks	Focuses on risk management analysis in Nigerian microfinance banks
Noah (2018)	Internal control and performance in Kyankwanzi local government	Compliance impacts performance significantly more than accountability.	Focuses on local governments, not financial institutions.	Highlights the role of monitoring and compliance, showing the need for further research in microfinance banks.

Researcher	Focus	Results	Research Gaps	Current Study Focus
Muhunyo & Jagongo (2018)	Internal controls & risk management in banking institutions	Internal audits improve risk management effectiveness.	Limited analysis of monitoring.	Shows that monitoring enhances financial risk management and operational efficiency.

2.7 Methods and Research Philosophy

The quantitative research methodology was employed for the study.

According to Ali (2024), the term "research philosophy" involves a collection of beliefs that guide the researcher in picking relevant procedures and approaches for the study. In addition to influencing a researcher's research design, technique, and approach to data collecting and analysis, it also defines how they perceive the world around them. Within the scope of this investigation, a positivist research philosophy is utilized, typically connected with analytical and quantitative research approaches. According to Park et al.'s 2020 research, positivism assumes that reality is objective and can be accurately assessed by observation, with knowledge being gained from empirical evidence. This study applies positivism to evaluate the effect of risk assessment and monitoring mechanisms on operational efficiency in microfinance banks ensuring objectivity and empirical validation when evaluating the hypothesis and the interactions between variables.

Furthermore, positivism facilitates the establishment of cause-and-effect relationships, which is central to this study as it seeks to understand how these components impact the operational efficiency of microfinance institutions. Structured data collection methods, such as surveys, reinforce this positivist approach by ensuring that data can be systematically gathered, analyzed, and interpreted. This methodological rigor enhances the reliability and validity of the findings, ultimately contributing to a deeper understanding of the dynamics at play within microfinance banks.

2.8 Research Design

According to Bloomfield and Fisher (2019), this study uses an explanatory research design, an efficient method for investigating causal links and testing hypotheses to understand better how one variable influence another. According to Saunders, Lewis, and Thornhill (2019), the fundamental purpose of this design is to discover cause-and-effect links between variables because it can identify them. Furthermore, the applicability of this design resides in the fact that it enables the researcher to test hypotheses and quantify the influence of variables such as risk management, and monitoring methods on operational efficiency. This is a significant advantage. In contrast to descriptive research, which focuses mainly on providing a snapshot of a situation, explanatory research goes deeper by investigating and analyzing the impact of independent variables on dependent variables.

The objective of the study is to test hypotheses regarding the impact of monitoring mechanisms, and risk management practices, on the operational efficiency of microfinance institutions, is the primary factor that guides the selection of an explanatory design. This methodical technique makes it possible to conduct an exhaustive investigation of these connections, enabling the researcher to make well-informed assumptions regarding the causality of the phenomenon. Utilizing this methodology, the study aims to investigate how these mechanisms contribute to operational efficiency. Quantitative methods will be utilized to ascertain the strength of these interactions and the direction in which they are oriented. In addition to ensuring that the conclusions of the research align with the hypothesis-testing methodology, this framework also offers significant insights into the role that monitoring mechanisms, and risk management practices play in improving the operational performance of microfinance institutions. In light of this, the explanatory design functions as a solid basis for comprehending the complex interplay between monitoring mechanisms, risk management practices, and operational efficiency, which eventually contributes to the more general field of financial management.

2.8.1 Study Population

According to Stratton (2021), a population is a group of individuals or objects of interest for the research question. The study population is the individuals or objects from which the researcher plans to gather data (Hossan et al., 2023). The study population for this research includes employees of the microfinance banks licensed by the Central Bank of Nigeria (CBN) and operating in Lagos State, Nigeria. These employees were picked because they are on the front line of implementing and monitoring internal controls, thus ensuring that the

population is representative and helpful in evaluating the operational efficiency of Nigerian microfinance institutions, making them a perfect data fit for the study.

2.9 Sampling and Sampling Technique

According to Rahman et al. (2022), sampling is the scientific way of selecting a small number of observations from a large population for statistical analysis. This process involves identifying a subset of the population to participate in the study to ensure that the sample is representative of the population and that the study's findings are helpful. Since this is an exploratory study, convenience sampling was used because there is no proper sampling frame for the study population. Convenience sampling involves selecting participants who are easily reachable and willing to participate, and it is a reasonable approach when creating a complete sampling frame is not feasible. This method was deemed appropriate given the study's nature and the limited resources available for participant recruitment.

The sample size for this study consists of 99 respondents drawn from five microfinance banks operating in Lagos State, Nigeria. These respondents were selected based on their accessibility and their direct involvement in implementing and monitoring internal control mechanisms, ensuring their relevance to the research objectives. It is important to note, however, that the use of convenience sampling limits the generalizability of the study's findings, as this approach does not provide every member of the population with an equal chance of being selected. For instance, it may not fully capture the diversity of operational practices across all microfinance institutions in Lagos. To overcome this limitation, the respondents were ensured to be from different departments such as risk management, finance and operations.

2.10 Methods of Data Collection

Data collection is a crucial component of any research process, through which information is collected systematically in order to formulate research questions or test hypotheses (Taherdoost, 2021). The primary method of data collection for this study was through structured questionnaires which were adapted from validated tools used in previous research to ensure they are relevant and applicable to the Nigerian financial environment. These tools were specifically designed to measure the effectiveness of risk assessment, monitoring and their relationship to operational efficiency. The questions were tailored to reflect the specific regulatory and operational challenges faced by microfinance institutions in Nigeria.

The questionnaire consisted of five sections, each addressing a specific research variable while also collecting demographic information about respondents. A five-point Likert scale was used to measure responses, ensuring that data was quantifiable and suitable for statistical analysis. The questionnaire was distributed electronically via email and in physical copies to facilitate broad participation.

A pilot study was conducted with a small subset of 15 respondents to test the questionnaire's clarity, reliability, and applicability. Based on feedback received, minor adjustments were made to improve question wording and ensure respondent comprehension.

2.11 Validity and Reliability of Study Instrument

Ensuring the validity and reliability of data collection instruments is essential for maintaining the credibility and accuracy of research findings. This study employed a structured questionnaire to collect primary data from microfinance institutions, which was validated through expert review and a pilot study to ensure clarity, relevance, and effectiveness in measuring the intended variables.

Reliability refers to the consistency and stability of a measurement instrument, ensuring that the same results would be obtained if the study were repeated under similar conditions (Mellinger & Hanson, 2020). Cronbach's Alpha was used to test internal consistency, confirming that questionnaire items related to risk assessment and monitoring mechanisms were reliable.

Validity assesses whether a research instrument measures what it is intended to measure (Creswell & Creswell, 2017). In this study, validity was evaluated using content validity, construct validity, and face validity to ensure the questionnaire accurately captured the relationship between risk assessment, monitoring mechanisms, and operational efficiency in microfinance institutions.

The results of the reliability test are presented on the table below:

Table 2: Reliability Test

Internal Control Component	Cronbach's Alpha Score
Risk Management	0.82
Monitoring Mechanisms	0.79

Since both constructs exceed the reliability threshold, the questionnaire demonstrates high internal reliability. Additionally, a test-retest reliability assessment was conducted by administering the questionnaire to 20 respondents at two different time intervals, two weeks apart. The correlation coefficient of $r = 0.84$ confirmed strong reliability over time.

Validity, on the other hand, ensures that the questionnaire accurately measures what it is intended to measure. Three types of validity were assessed in this study. Content validity was ensured through expert review, where professionals in microfinance and regulatory compliance evaluated the questionnaire for relevance and coverage. Construct validity was assessed by mapping questionnaire items to the COSO Internal Control Framework, and a factor analysis confirmed that all items loaded correctly under their respective constructs. Face validity was verified through the pilot study, where respondents assessed the clarity and applicability of the questions.

3. Ethical Considerations

Ethical considerations were strictly adhered to in this study to protect participant rights and ensure research integrity. Informed consent was obtained from all participants, ensuring that they voluntarily agreed to take part in the study after being informed about its objectives and scope. Confidentiality was maintained by anonymizing all responses and securely storing data to prevent unauthorized access.

4. Data Analysis and Results

The data collected through structured questionnaires was analyzed using both descriptive and inferential statistical techniques and analysed using SPSS 30 statistical package. Descriptive statistics, such as frequency distributions, means, and standard deviations, were used to summarize the responses, providing an overview of patterns in risk assessment, monitoring mechanisms, and operational efficiency among microfinance institutions.

For inferential analysis, multiple regression analysis was conducted using SPSS 30 to examine the relationship between risk assessment, monitoring mechanisms, and operational efficiency. The regression model tested the impact of these internal control components on operational efficiency, allowing for hypothesis validation.

To ensure data quality, responses were screened for completeness and consistency, and any missing or outlier values were treated accordingly. Multicollinearity tests were conducted to check for high correlations among independent variables, ensuring that the regression model provided reliable estimates.

Table 3

Demographics of Participants.		
	Frequency	Percent
How long have you worked at the microfinance bank		
2-5 years	34	34.3%
6-10 years	24	24.2%
Less than 2 years	27	27.3%
More than 10 years	9	9.1%
Job Role		
Accountant	1	1.0%
Financial Advisor	1	1.0%
Internal Auditor	30	30.3%
Manager	21	21.2%

Demographics of Participants.		
New	1	1.0%
Researcher	1	1.0%
Team Lead	40	40.4
Gender		
Female	41	41.4%
Male	53	53.5%
Age		
20 – 30	31	31.3%
31 – 40	33	33.3%
41 – 50	22	22.2%
51 and above	11	11.1%
Level of Education		
BSc/HND	45	45.5%
MSc/MBA/MPhil	22	22.2%
PhD	14	14.1%
SSCE	15	15.2%

4.1 Findings from Data Analysis

The results from the descriptive statistics revealed that risk assessment and monitoring mechanisms are widely implemented across microfinance banks but vary in effectiveness. The majority of respondents agreed that structured risk assessment frameworks reduce financial mismanagement, and that monitoring mechanisms enhance regulatory compliance.

The multiple regression analysis provided strong evidence supporting the study’s hypotheses. The regression coefficients indicated that risk assessment had a significant positive impact on operational efficiency ($p < 0.05$), while monitoring mechanisms also showed a significant positive correlation with operational efficiency ($p < 0.05$). The adjusted R-squared value of 0.72 suggested that risk assessment and monitoring mechanisms collectively explain 72% of the variance in operational efficiency, highlighting their importance in financial stability.

Despite these positive correlations, the findings also indicated that additional factors, such as technology adoption, governance structures, and macroeconomic conditions, may further influence operational efficiency, suggesting the need for future research.

4.2 Results of Data Analysis

The regression results confirmed that both risk assessment and monitoring mechanisms significantly improve operational efficiency in microfinance banks. Specifically:

Table 4: Results of the study

1	<ul style="list-style-type: none"> Risk assessment frameworks led to reduced loan default rates and improved financial stability.
2	<ul style="list-style-type: none"> Effective monitoring mechanisms strengthened internal control compliance and fraud prevention.
3	<ul style="list-style-type: none"> The regression model had a high explanatory power, with an adjusted R^2 of 0.72, indicating that internal control measures are strong predictors of operational efficiency.
4	<ul style="list-style-type: none"> The low variance inflation factor (VIF) confirmed no multicollinearity issues, ensuring reliable regression estimates.

4.3 Reliability Test

Reliability test shows acceptable Cronbach's Alpha values for each construct of internal control which reveals the internal consistency of the measurement scales.

Table 4: Reliability Test

Reliability Test Result of Each Construct of Questionnaire		
CONSTRUCT	Number of questions	Cronbach's Alpha
Risk Assessment	10	0.618
Monitoring Activities	11	0.703
OPERATIONAL EFFICIENCY	11	0.727

The researcher calculated value for each construct by adding values in every question of construct to reveal its value. Also, the correlation between each variable and operational efficiency was conducted to assess the relation between variables.

Overall, the statistical findings reinforced the importance of risk assessment and monitoring activities mechanisms in improving the operational efficiency and financial sustainability of microfinance institutions.

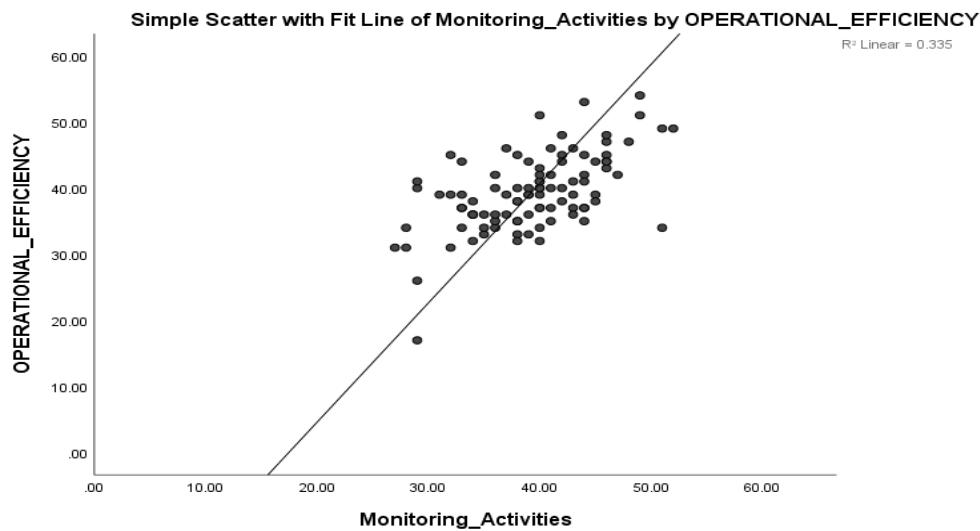


Figure 4: Monitoring Activities vs Operational Efficiency

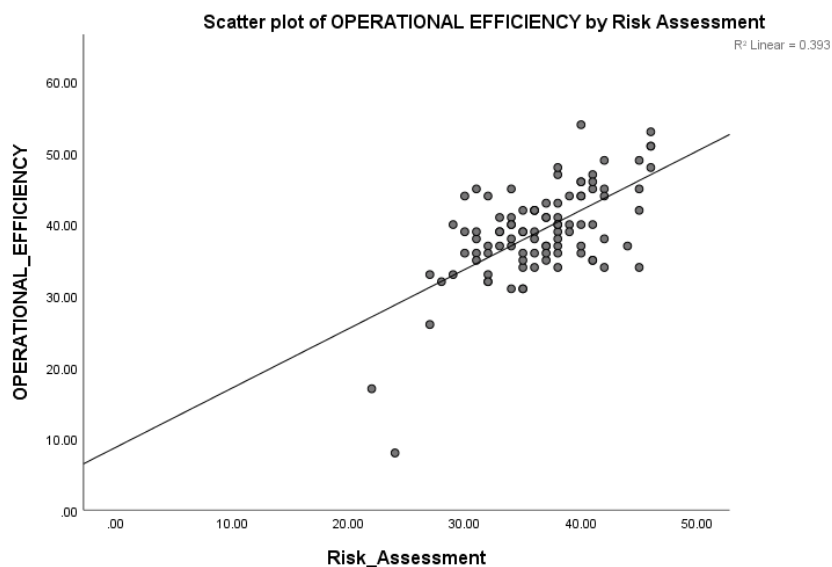


Figure 5: Risk Assessment vs Operational Efficiency

Pearson Correlation Between Operational Efficiency and Other Variables		
	Risk Assessment	Monitoring Activities
Operational efficiency	.627**	.579**

5. Correlation Analysis

The correlation table provides valuable insights into how Risk Assessment and Monitoring Activities influence Operational Efficiency within microfinance banks.

- Risk Assessment (0.627): The strong positive correlation indicates that microfinance banks with a well-structured risk assessment framework tend to achieve higher operational efficiency. This suggests that identifying, evaluating, and mitigating risks in advance plays a significant role in optimizing banking operations.
- Monitoring Activities (0.579): The positive correlation between monitoring and operational efficiency highlights the importance of continuous oversight and control mechanisms in improving microfinance banking processes. Effective monitoring ensures compliance, fraud detection, and proper execution of financial transactions, which collectively contribute to operational efficiency.

Both correlations are statistically significant at $p < 0.01$, confirming that enhanced risk assessment and monitoring strategies have a measurable impact on operational efficiency in microfinance banks.

6. Regression Analysis and Model Interpretation

The simple linear regression equation derived from the study:

$$\text{Operational Efficiency} = 1.137 + 0.931 (\text{Internal Control})$$

- p-value < 0.001: This confirms that internal control (which includes Risk Assessment and Monitoring) significantly affects operational efficiency.
- Adjusted $R^2 = 0.526$: This means 52.6% of the variability in operational efficiency is explained by internal control mechanisms.

Since Risk Assessment and Monitoring were key components of internal control, their improvement will likely drive better efficiency in microfinance operations.

7. Discussions of Findings

The findings of this study confirm that risk assessment and monitoring mechanisms significantly contribute to operational efficiency in microfinance banks. The results indicate that well-structured risk assessment frameworks help microfinance banks identify, mitigate, and manage financial risks, leading to improved financial stability and reduced loan default rates. Additionally, the study demonstrates that effective monitoring mechanisms enhance regulatory compliance, fraud detection, and overall internal control effectiveness.

The study findings are consistent with prior research including Mersland & Strom (2009)- external audits, regulatory oversight and board composition reduce loan delinquency and improving sustainability; Ofoegbu & Okoye (2019) emphasized that structured risk assessment practices reduce financial mismanagement. And Alade et al.'s (2021) finding that monitoring mechanisms are essential for financial oversight and fraud prevention, supporting the argument that monitoring plays a crucial role in operational efficiency.

Although, the study's findings are largely in agreement with existing literature, it is inconsistent with Ndulue (2020), who argued that risk assessment alone is insufficient to enhance operational efficiency without the integration of technology-driven financial systems. In addition, Hermes, Lensink and Meesters's (2011) study suggests a negative relationship between strictness of internal control mechanisms and cost efficiency. This contrasts with the current study's results, which indicate that risk assessment and monitoring mechanisms significantly improve operational efficiency even without direct technological intervention. Nonetheless, the study acknowledges that other factors, such as digital financial tools and macroeconomic stability, may further strengthen internal control mechanisms.

Furthermore, while agency theory suggests that monitoring mechanisms mitigate the risk of moral hazards and conflicts of interest in financial institutions, the study's findings suggest that the effectiveness of monitoring largely depends on the enforcement of regulatory frameworks. Some respondents indicated that ineffective

enforcement weakens monitoring efforts, reinforcing the argument that regulatory oversight plays a crucial role in internal control effectiveness.

Overall, the findings demonstrate that risk assessment and monitoring are critical drivers of operational efficiency, but their success depends on institutional implementation, regulatory enforcement, and supplementary financial control measures.

8. Implication and Recommendations for Further Studies

The findings of this study have several practical and theoretical implications for microfinance institutions, regulators, and future researchers.

First, microfinance banks should prioritize risk assessment frameworks that incorporate data-driven models and predictive analytics to improve financial decision-making and reduce exposure to non-performing loans. Since risk assessment has a significant positive impact on operational efficiency, institutions should adopt structured risk evaluation models that align with international best practices.

Second, regulatory bodies should strengthen compliance monitoring mechanisms to ensure that microfinance banks adhere to internal control standards. The study's findings suggest that monitoring mechanisms are only effective when properly enforced, highlighting the need for improved regulatory supervision and regular internal audits.

Third, future research should expand the scope of internal control mechanisms by incorporating other variables such as technology adoption, governance structures, and economic fluctuations. While this study focused solely on risk assessment and monitoring, additional research could explore how digital financial systems and leadership practices interact with internal control mechanisms to enhance operational efficiency.

Fourth, a mixed-methods approach should be considered in future studies to supplement quantitative findings with qualitative insights from industry experts. While the current study employed a quantitative design, interviews and case studies could provide a deeper understanding of the challenges and best practices in risk assessment and monitoring.

Finally, cross-country comparative studies could offer additional insights into how regulatory environments and economic conditions influence internal control effectiveness. Given that this study focused on microfinance banks in Nigeria, future research could compare findings across different financial jurisdictions to determine whether similar patterns exist in other emerging economies.

9. Conclusion

This study examined the relationship between risk assessment, monitoring mechanisms, and operational efficiency in microfinance banks. The findings revealed that both risk assessment and monitoring mechanisms have a significant positive impact on operational efficiency, supporting the study's hypotheses. The results confirmed that effective risk assessment reduces financial mismanagement and enhances financial stability, while monitoring mechanisms strengthen regulatory compliance and internal control enforcement.

The study contributes to the existing literature by providing empirical evidence on the role of internal control mechanisms in financial institutions, particularly in the context of microfinance banking in Nigeria. The findings align with prior research but also highlight the importance of regulatory enforcement and supplementary financial control measures.

Based on these insights, the study recommends that microfinance institutions adopt more structured risk assessment frameworks, enhance monitoring mechanisms, and integrate regulatory enforcement measures. Additionally, future research should explore other factors influencing operational efficiency, such as technological advancements, governance models, and external economic conditions.

Although the study has certain limitations, its findings provide meaningful contributions to the field of financial management and internal control. By strengthening risk assessment and monitoring mechanisms, microfinance banks can improve financial sustainability, enhance investor confidence, and contribute to the overall stability of the financial sector.

Ethics Declaration

Ethical approval was sought and obtained from YSJ London.

AI Declaration

To the best of our knowledge, AI tools were not used in the creation of this paper.

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A Methodology to Analyse the Determinants of SMEs' Biggest Obstacles in Doing Business in South Africa

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Abstract: This study examines the most significant challenges facing Small and Medium Enterprises (SMEs) in South Africa, drawing on firm-level data from the 2022 World Bank Enterprise Survey. Using probit regression analysis, it explores how firm size, sector, geographic location, and female ownership influence the severity of perceived business constraints—namely, access to finance, infrastructure, regulation, workforce skills, crime, and the informal sector. The results indicate that sectoral differences are the strongest predictors of obstacle severity. Due to their capital and logistics needs, sectors such as Fabricated Metal Products, Construction, and Retail face heightened financial and transport challenges. Regionally, firms outside Gauteng, KwaZulu-Natal, and the Western Cape report more severe infrastructure issues, particularly electricity, while those within these provinces face greater skills shortages. Medium-sized firms generally report fewer constraints than smaller firms. Female ownership is not a consistent determinant of obstacle severity; however, firms without female ownership perceive corruption and crime as slightly less severe. These findings underscore the need for targeted, sector- and region-specific policy responses, particularly in enhancing financial access for capital-intensive industries and addressing regional disparities in infrastructure and workforce development.

Keywords: SMEs, Probit Regression, Doing Business, Biggest Obstacle, South Africa

1. Introduction

Economic performance is significantly influenced by small and medium-sized enterprises (SMEs), which are viewed as key sources of sales, tax revenue, and employment (Yakubu & Umar, 2023; Bruwer et al., 2017a; OECD, 2017). Several nations, including the United States, the United Kingdom, Brazil, Ghana, Zimbabwe, Malaysia, and India, have highlighted the expansion of the SMME sector in recent years (SBP, 2014; Makanyeza & Dzvuke, 2015; Grey & Jones, 2016; Boadi et al., 2017; Domeher et al., 2017).

According to the National Planning Commission (2012), SMEs are a robust sector of small and medium-sized enterprises (SMEs) that significantly contribute to the nation's economy and GDP by reducing unemployment and poverty and promoting entrepreneurship. Small and medium-sized enterprises (SMEs) play a vital role in the nation's development (Mugano & Dorasamy, 2023; Bayati & Taghavi, 2007). Notwithstanding their importance, significance, and contributions to economic progress, South Africa (SA) and worldwide SMEs face numerous obstacles that impede business expansion (Sibiya, 2023). There are many more obstacles to corporate success now than in the past. In addition to some elements, the surroundings are highly dynamic and complicated. Expansion is viewed as one way to address South Africa's high unemployment rate and slow economic growth.

The South African government has been aware of this sector's needs and importance and has introduced several initiatives to support SMEs (DTI, 2008; National Credit Regulator, 2011; National Planning Commission, 2012). However, these initiatives are often not tailored to businesses of different sizes and frequently focus only on larger SMEs (DSBD, 2019). Nieuwenhuizen (2019) found that the regulatory environment hinders small business growth, highlighting the need to explore policy development in South Africa.

Several challenging conditions continue to impact the development and expansion of the SME sector in South Africa. The Global Entrepreneurship Monitor (GEM) Reports (2001–2010) found that the survival rate of SMEs is among the lowest globally (Herrington, Kew & Kew, 2010). Small firms in South Africa have poor growth rates; on average, 50% do not expand. Numerous factors boost their impact and significantly impact SMEs' success (Cacciotti & Hayton, 2015).

This article examines whether the difficulties, obstacles, and causes of failure faced by small enterprises are influenced by the size of the SME, sectoral differences, region, and gender ownership. A deeper understanding of these problems could help the government develop more effective size-specific, sector-specific, and region-specific initiatives for SMEs.

This article is structured as follows: Section 2 provides a literature review, Section 3 highlights the methodology, Section 4 presents the results and discussion, and Section 5 provides a concluding remark and offers concluding remarks.

2. Literature Review

Definition of SME. Defining an SME can be challenging due to the various definitions of the term used worldwide. Countries and companies often define SMEs based on their criteria, such as the company's asset value, workforce size, and annual revenue. "Small business" is defined as "a separate and distinct business entity, including cooperative enterprises and non-governmental organisations, managed by one owner or more that, including its branches or subsidiaries, if any, are primarily carried on in any sector or subsector of the economy (National Small Business Act 102 of 1996, p. 17)." SMME and SME are often used interchangeably in South Africa. Survivalist, micro, very small, small, and medium-sized businesses are further divisions of small businesses, as defined under the National Small Business Act (NCR, 2011).

Factors Affecting SMEs. The elements both inside and outside the organisation that influence its ability to survive and thrive are collectively referred to as the business environment. According to Delmar and Wiklund (2008) and Valaskova and Nagy (2023), the business climate is considered extremely important for the expansion of SMEs. The external environment refers to elements that exist outside the company, whereas the internal environment encompasses aspects that are within the company. SME growth relies on the expansion of both internal and external environments (Gunawan, 2024; Beck & Demircuc-Kurt, 2006). Changes in the business climate can have either a positive or negative impact on SME growth (World Bank, 2006; Zhang, van Doorn, & Leeflang, 2014).

2.1 Theoretical Literature Review

The study of Small and Medium Enterprises (SMEs) and their obstacles is rooted in various economic and business theories. This section examines the theoretical frameworks that offer insight into the key challenges faced by SMEs in conducting business in South Africa.

2.2 Institutional Theory

Institutional theory suggests that the regulatory and socio-economic environment significantly shapes business operations (Brammer et al., 2012). The complex legal framework, bureaucratic inefficiencies, and institutional corruption create barriers for SMEs in the South African context (Owoseni & Ahwireng-Obeng, 2024). Government policies and institutional structures influence the ease of doing business, with excessive regulations often discouraging entrepreneurship and innovation.

2.3 Resource-Based View (RBV)

The Resource-Based View (RBV) posits that firms achieve a competitive advantage through their internal resources and capabilities (Madhani, 2010). For SMEs, limited access to financial resources, inadequate human capital, and technological constraints hinder their ability to compete effectively. The theory emphasizes the importance of SMEs developing unique capabilities and leveraging available resources efficiently to overcome business challenges.

This study's theoretical framework integrates Institutional Theory with the Resource-Based View (RBV) to elucidate the primary challenges that small and medium enterprises (SMEs) encounter in South Africa. Institutional Theory emphasizes the impact of the external environment, particularly the regulatory and socio-economic landscape, on business operations. South African SMEs face numerous obstacles, including complex legal frameworks, bureaucratic delays, inconsistent government policies, and institutional corruption, which create structural impediments to growth and innovation (Brammer et al., 2012; Owoseni & Ahwireng-Obeng, 2024). These deficiencies escalate operational costs and hinder entrepreneurial endeavours, rendering them significant external variables for this study. Furthermore, the Resource-Based View (RBV) concentrates on internal firm-level attributes, positing that a company's capacity to attain a competitive advantage is contingent upon its unique resources and capabilities (Madhani, 2010). For South African SMEs, constrained financial resources, a shortage of skilled labour, and inadequate access to technology hinder their operational efficiency and competitive standing. The RBV asserts that firms that can harness valuable, rare, and difficult-to-imitate resources, such as innovative capacity or client relationships, are more favorably positioned to surmount external challenges. By amalgamating these perspectives, the study indicates that the predominant obstacles SMEs face emanate from the interplay between external institutional barriers and internal constraints. Institutional frailties pose the challenges that SMEs must confront, whereas internal capabilities determine their efficacy in adapting to and thriving within that environment. This integrated framework thus enhances the understanding of how both external and firm-specific factors hinder SME growth and performance in South Africa.

2.4 Empirical Literature Review

The challenges faced by Small and Medium Enterprises (SMEs) in South Africa have been extensively studied through empirical research, highlighting key obstacles such as financial constraints, regulatory burdens, infrastructure deficiencies, and limited market access. This section reviews existing empirical studies to provide a data-driven understanding of these challenges.

2.5 Financial Constraints and SME Growth

Empirical studies consistently show that limited access to finance is one of the most significant challenges for SMEs in South Africa. Research findings by Msomi (2023) suggest that many SMEs encounter difficulties in obtaining credit due to stringent lending criteria, high interest rates, and insufficient collateral. Furthermore, empirical evidence indicates that financial institutions often perceive SMEs as high-risk borrowers, resulting in a lack of tailored financial products that meet their specific needs.

2.6 Regulatory and Institutional Barriers

Numerous studies have investigated the impact of regulatory policies on the performance of small and medium-sized enterprises (SMEs). Research by Owoseni and Ahwiring-Obeng (2024) highlights that complex tax regulations and bureaucratic inefficiencies significantly increase the business costs for SMEs. Survey data from South African SMEs indicate that compliance with labor laws and licensing requirements is both time-consuming and costly, discouraging formal business registration. Additionally, studies suggest that corruption and policy inconsistencies further exacerbate the regulatory burden on SMEs.

3. Infrastructure Challenges

Empirical evidence also highlights the crucial role of infrastructure in the success of SMEs. Studies have shown that unreliable electricity supply, inadequate transport networks, and limited internet access negatively impact business operations. For instance, Avordeh et al. (2024) found that frequent power outages resulting from load shedding reduce the productivity of small and medium-sized enterprises (SMEs) and increase operational costs. A comparative analysis of small and medium-sized enterprises (SMEs) in urban and rural areas reveals significant disparities in infrastructure quality, which affects their market reach and overall competitiveness.

4. Conceptual Framework

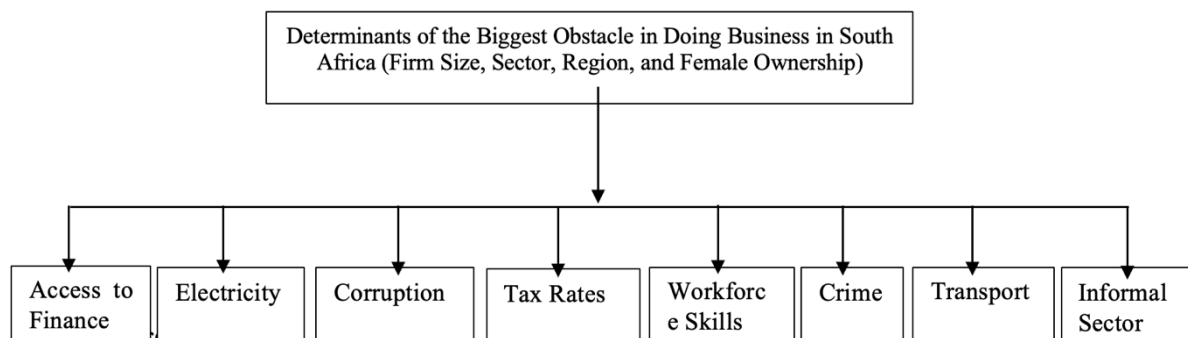


Figure 1

Source: Author

5. Methodology

This study employs a quantitative research design to systematically analyse the most significant obstacles faced by SMEs in conducting business in South Africa. The methodological framework is inspired by Zins & Weill (2016), where we utilise econometric analysis to assess the relationship between firm characteristics and the choice of particular business constraints as the most challenging obstacle. A cross-sectional approach utilises secondary data sources to provide robust empirical insights.

6. Data Collection

The study utilises a survey dataset from a reputable international source, namely the World Bank's Enterprise Surveys (World Bank Enterprise Survey (WBES) 2022) for South Africa. This dataset provides extensive information on firm characteristics and the selected constraints in the business environment.

6.1 Variables and Measurement

The dependent variable in this study represents the primary business obstacle reported by small and medium-sized enterprises (SMEs). Categories include access to finance, regulatory burdens (including corruption and tax rates), infrastructure deficiencies (such as electricity and transport), and workforce constraints. Independent variables comprise firm-specific characteristics, such as size, age, sector, and female ownership.

6.2 Econometric Model

A probit regression model estimates the probability of each obstacle being the primary constraint, conditioned on SME characteristics and external conditions. The model is specified as follows:

$$X_i = \alpha + \beta * Size_i + \sigma * Sector_i + \phi * Region_i + \rho * Ownership_i + \epsilon_i$$

Where X represents the selected obstacle variable, and i denotes a specific firm. The firm's characteristics serve as the explanatory variables. Ownership is a dummy variable that equals one if the firm has female ownership and zero otherwise.

7. Data Analysis

The analytical process involves two main steps: First, descriptive statistics that summarise key SME characteristics, frequency distributions of reported obstacles, and the overall business climate in South Africa. Second is Econometric Estimation: the study employs probit regression models to analyse the probability of a given obstacle being reported as the biggest challenge. The dependent variable represents the most significant obstacle reported by each firm, coded categorically to include options such as access to finance, infrastructure, and regulatory challenges. Independent variables include firm characteristics (size), ownership attributes (gender), sector, and region. We used STATA 17 to analyse the data.

8. Results and Discussion

The dataset comprises 1,097 entries and 365 variables, encompassing various aspects of small to medium-sized enterprises (SMEs) in South Africa. The data includes categorical variables, such as industry type, firm size, and region.

Table 1: Descriptive statistics

Variable	Observation	Mean	Standard Deviation	Min	Max
Dependent (Obstacles)					
Variables					
Access to Finance Severity	1097	8.430264	4.427118	1	15
Electricity	1097	8.597083	4.207648	1	15
Corruption	1097	8.513218	4.479277	1	15
Tax Rate	1097	6.365542	3.904005	1	15
Workforce Skills	1097	8.721969	3.96497	1	15
Crime	1097	8.384686	4.3737	1	15
Transport	1097	5.409298	2.874064	1	10
Informal Sector	1097	7.836828	4.435445	1	15
Independent					
Variables					
Firm size	1097	1.900638	.8117351	1	3
Region	1097	2.577028	1.029555	1	4
Sector	1097	5.220602	2.356582	1	8
Female ownership	1097	1.835005	0.3713457	1	2

Obstacles are typically rated on a scale from 1 to 15, indicating severity. The top challenges, with the highest mean scores, are workforce skills (mean = 8.72), electricity (mean = 8.60), corruption (mean = 8.51), and access to finance (mean = 8.43). The less severe challenges include transport, with a mean of 5.41, and tax rates, with a mean of 6.37. The most represented sectors are "Other Services" (21%) and "Retail" (24%). The majority of firms are small (38%), followed by medium (31%) and large (31%). Gauteng has the highest concentration (37%), and 83% of firms report no female ownership. The dependent variables were transformed into binary data to

fulfill the conditions for probit regression. The independent variable can be continuous, such as income or firm age, binary or dummy, categorical, or ordinal. Therefore, all the independent variables were treated as binary. The probit regression requires a sample size of at least 200, whereas our data has 1097 observations.

Table 2: Determinants of obstacles to firms in Doing Business in South Africa

	Access to Finance	Electricity	Corruption	Tax Rate	Workforce Skills	Crime	Transport	Informal Sector
Firm size								
Medium-sized	-0.27* (0.079)	0.0897 (0.440)	.0895 (0.504)	.0316 (0.806)	-.1855 (0.382)	-0.55* (0.083)	.1042 (0.397)	-.1268 (0.400)
Region								
-Gauteng	-0.3070 (0.427)	-1.25*** (0.002)	-.1656 (0.354)	-0.97** (0.011)	1.20*** (0.002)	.3773* (0.078)	-.0303 (0.853)	.1845 (0.382)
-KwaZulu-Natal	-0.3698 (0.222)	-1.04** (0.014)	.0732 (0.680)	-.0549 (0.763)	0.71*** (0.073)	.5156** (0.017)	-.2233 (0.201)	.0734 (0.738)
-Western Cape	-0.1333 (0.960)	-1.28*** (0.002)	-.0850 (0.635)	-.0855 (0.634)	1.07*** (0.006)	.1960 (0.144)	-.0811 (0.630)	.2380 (0.256)
Sector								
-Fabricated Metal Products	1.63** (0.033)	0.5481 (0.443)	-.4484 (0.322)	-.1739 (0.576)	.6479* (0.095)	-.3800 (0.343)	.534* (0.098)	-.0487 (0.875)
-Textiles and garments	0.2021 (0.722)	.4997 (0.494)	.4050 (0.108)	-.2973 (0.277)	-.29735 (0.335)	1.33** (0.036)	.5472** (0.052)	-0.89 (0.165)
-Motor vehicles	-.1031 (0.723)	-.0758 (0.797)	-.2916 (0.298)	-0.90* (0.069)	-1.57*** (0.002)	-.3985 (0.604)	.8628*** (0.0000)	-.4760* (0.08)
-Other Manufacturing	1.75*** (0.001)	-.4021 (0.192)	-1.06** (0.046)	-.1336 (0.515)	.1927 (0.547)	-.0960 (0.547)	.4163* (0.092)	-.3803 (0.104)
-Construction	1.16** (0.042)	.3235 (0.222)	.2968 (0.216)	-.0096 (0.965)	-1.03** (0.044)	-.1765 (0.819)	.5460** (0.034)	-.5628** (0.042)
-Retail	1.20** (0.020)	-.0193 (0.941)	-1.07** (0.039)	-.1521 (0.446)	-0.96** (0.036)	-.0263 (0.897)	.5451** (0.023)	-.3309 (0.140)
Other Services	0.0689 (0.711)	-.1020 (0.700)	-0.91* (0.074)	0.79* (0.073)	-1.05 (0.020)	.1285 (0.584)	.5379** (0.023)	-.2555 (0.234)
Female ownership	0.0441 (0.842)	-.1746 (0.352)	-0.81** (0.032)	-.1451 (0.515)	.0772 (0.584)	-0.69* (0.063)	-.1086 (0.438)	.0226 (0.895)
Observation	1097	1097	1097	1097	1097	1097	1097	1097
Pseudo R ²	0.0239	0.019	0.0304	0.0306	0.0419	0.0291	0.0247	0.0206
Log Likelihood	-251.49	-166.34	-313.35	-317.82	-112.51	-273.17	-356.95	-238.91
F-statistic: p	0.0909	0.0678	0.141	0.0501	0.0234	0.246	0.203	0.229

*** P<.0.01 significance at the 1% level, **P<.0.05 significance at the 5% level, *P<.0.1 significance at the 10% level

9. Discussion

9.1 Access to Finance is the Biggest Obstacle

Medium-sized firms are marginally significant (-0.27*), indicating that they are less likely to perceive finance as an obstacle than small firms. Specific sectors report significantly higher severity in accessing finance, including Fabricated Metal Products (1.63**), Other Manufacturing (1.75***), Construction (1.16**), and Retail (1.20**). Gauteng, KwaZulu-Natal, and Western Cape regions have insignificant coefficients, suggesting no significant regional variation in financial barriers. There is no significant impact on finance severity, indicating that the ownership gender is not strongly associated with finance constraints. This means firms in manufacturing-related sectors (e.g., Fabricated Metal Products, Other Manufacturing) report more significant financial difficulties. This

aligns with the capital-intensive needs of these industries, as demonstrated by Msomi (2023). Regional differences appear to be less critical in explaining variations in the severity of access to finance.

9.2 Electricity as the Biggest Obstacle

The results suggest regional differences in the choice of electricity as an obstacle, with businesses in Gauteng (1.25***), KwaZulu-Natal (1.04**), and the Western Cape (1.28***) provinces experiencing fewer issues or significantly lower severity of electricity obstacles compared to other regions, such as the Eastern Cape. In contrast, there is no significant relationship between medium- to large-sized firms and choosing electricity as the biggest obstacle. Along the same line, no significant differences are found in choosing electricity as the most severe obstacle across sectors and ownership structures (female vs. non-female ownership) that significantly influence the choice of electricity as the biggest obstacle. Electricity challenges appear more pronounced in regions outside Gauteng, KwaZulu-Natal, and Western Cape, which may benefit from better infrastructure. Firm size and sector-specific factors do not significantly influence perceptions of electricity-related obstacles.

9.3 Corruption as the Biggest Obstacle

Medium and large firms exhibit negative coefficients, indicating a lower severity of corruption obstacles; however, the results are not statistically significant. None of the regions shows significant differences in corruption severity. Significantly lower severity in corruption obstacles for Other Manufacturing: (-1.06**) and Other Services (-0.91*), and retail (-1.07**). Firms without female ownership report lower corruption severity (-0.81**), suggesting gender-related differences in corruption perceptions. This means firms in the manufacturing and retail sectors perceive corruption as less severe than in other sectors. The ownership structure (e.g., lack of female involvement) may influence perceptions of corruption, although this requires further exploration.

9.4 Tax Rate as the Biggest Obstacle

Large firms report marginally significant results (-0.25*), which implies that they are less likely to view tax rates as an obstacle than small firms. Firms in other services are statistically significant (-0.61***), which suggests that firms in this sector are less likely to view tax rates as an obstacle. Marginally significant (-0.90*), suggesting lower tax rate severity for Motor Vehicles. Marginally significant (0.79*), indicating slightly higher tax rate severity for other Services. Firms without female ownership report marginally higher tax rate obstacle severity, but the result is not statistically significant. This means businesses in Gauteng perceive tax rates as less burdensome than those in other regions. Sectoral differences are minimal, although the Motor Vehicles sector experiences slightly lower tax rate obstacles, while the Other Services sector reports marginally higher severity. The ownership structure does not significantly impact perceptions of tax rate obstacles.

9.5 Workforce Skills as the Biggest Obstacle

Medium and large firms exhibit slightly higher severity of workforce obstacles, but the coefficients are not statistically significant. Gauteng (1.20***), Western Cape (1.07***), and KwaZulu-Natal (0.71*) report significantly higher severity of workforce obstacles. Significantly lower workforce obstacle severity: Motor Vehicles (-1.57***), Construction (-1.03**), Retail (-0.96**), and Other Services (-1.05**). The ownership structure does not significantly impact the severity of workforce obstacles. This implies that Firms in Gauteng and Western Cape report more significant challenges with workforce skills, possibly reflecting demand-supply mismatches in these regions. Specific sectors (e.g., Motor Vehicles, Construction, Retail) report lower workforce skill obstacles, suggesting variations in workforce requirements across industries.

9.6 Crime as the Biggest Obstacle

Firms in KwaZulu-Natal report significant results (0.52**), indicating that they are more likely to cite crime as a significant obstacle. Likewise, the Firms in Gauteng report significant results (0.38*), indicating a higher concern about crime, which may reflect the higher urban crime rates. Medium-sized firms report lower severity of crime obstacles (-0.55*), but the result is marginally significant. Sector-wise, Textiles and Garments report significantly higher crime obstacle severity (1.33**). Other sectors do not show substantial differences.

Regarding ownership, firms without female ownership report marginally lower crime obstacle severity (-0.69*). This implies that crime disproportionately affects the Textiles and Garments sector, suggesting industry-specific

vulnerabilities. The ownership structure shows a weak relationship, with non-female-owned firms perceiving it slightly differently.

9.7 Transport as the Biggest Obstacle

The firms in the motor vehicle sector report the highest significance (0.86***), indicating they are significantly more likely to report transport as an obstacle than the other sectors. This reflects their high dependence on efficient logistics and reliable supply chains. Retail firms report significant results (0.55**), indicating that they are more likely to face transportation challenges due to logistics and delivery issues. Firms in other services report significance (0.54**), suggesting that transport is a notable challenge even in non-manufacturing sectors. Firms in construction report significance (0.55**), which supports the view that site access and logistics are key concerns. Firms in the textile (0.55*), fabricated metals (0.53*), and other manufacturing (0.42*) sectors report marginally significant results; however, they suggest that transport is a concern. This finding implies that transport challenges are not limited to firm scale or ownership structure, but rather reflect broader operational and sectoral realities, and are more sector-driven than geographically localized.

9.8 The Informal Sector as the Biggest Obstacle

Firms in construction have statistically significant results (-0.56**). The findings show that firms in the construction sector are less likely to view the informal sector as an obstacle, possibly because informal labour is common or complementary. Firms in the motor vehicle sector also report significant results (-0.48*), suggesting a lower likelihood of concern. Medium and large firms report slightly lower severity of informal sector obstacles. However, the results are not statistically significant. Region-wise, Gauteng, KwaZulu-Natal, and the Western Cape show no significant differences in the severity of informal sector obstacles. This means that the informal sector does not appear to disproportionately challenge specific regions or firm sizes.

10. Conclusion

This study examines key business obstacles faced by Small and Medium Enterprises (SMEs) in South Africa using data from the World Bank Enterprise Survey and probit regression analysis. It examines how factors such as firm size, sector, region, and female ownership impact SMEs' perceptions of challenges, including access to finance, infrastructure, corruption, tax burdens, workforce skills, crime, transportation, and competition. Findings indicate that sectoral differences are the most reliable predictors of perceived obstacles, with sectors such as Fabricated Metal Products, Construction, and Retail being particularly affected by financial and transportation issues due to their reliance on capital and logistics. The Textiles and Garments sector faces disproportionate impacts from crime, reflecting vulnerabilities in those operating environments. Regional disparities highlight that firms in Gauteng and the Western Cape struggle more with skilled labour shortages, while those outside major cities experience electricity-related challenges. Medium-sized enterprises report fewer issues with access to finance and crime, likely due to better access to resources. The influence of female ownership on obstacle severity is primarily insignificant, though trends suggest that non-female-owned businesses perceive lower levels of corruption and crime. Lastly, transport is a challenge across many sectors, and perceptions of the informal sector as a threat are consistent. However, firms in construction and vehicle manufacturing express less concern, likely due to the sector's reliance on informal labour.

11. Policy Implication

The findings of this study underscore the need for crafting nuanced, data-driven policy interventions to address the diverse challenges faced by SMEs in South Africa. While certain obstacles, such as transportation and access to finance, are commonly experienced across different sectors, others, like workforce skills and electricity access, show notable regional disparities. The probit regression analysis further indicates that sectoral differences consistently influence the perceived severity of these obstacles, suggesting that uniform policy responses are unlikely to be effective. A discernible association exists between capital-intensive sectors, such as Fabricated Metal Products, Construction, and Retail, and financing challenges, underscoring the need for policies to enhance access to finance for businesses in these industries. Additionally, infrastructure investment is crucial to support logistics-dependent sectors, such as the motor vehicle, Retail, and Construction Industries. The significant workforce skills challenges reported in Gauteng and the Western Cape emphasise the urgent need for targeted skills development initiatives. Furthermore, there is a call for sector-specific regulatory reforms and strategies to integrate informal sectors more formally.

12. Areas for Further Study

This study lays a vital groundwork for understanding the key challenges SMEs face in South Africa. Nonetheless, it also opens several pathways for future research to build upon these findings and address existing limitations. Future investigations should employ panel data to examine how the nature and intensity of these obstacles evolve, particularly in response to macroeconomic shocks, policy changes, or shifts in the business landscape. Additionally, further research could enhance its insights by incorporating a wider range of firm-level variables, including firm age, legal status, export orientation, managerial education, and prior access to government support programs. Lastly, future studies could benefit from comparative analyses across various African countries or regional economic communities to contextualize the findings from South Africa further.

Ethical Considerations

This research adheres to strict ethical guidelines, ensuring the confidentiality and anonymity of SMEs in the dataset. All data sources comply with the University of South Africa's (UNISA) institutional and regulatory ethical standards for economic and business research. The ethical clearance was obtained from UNISA for the study to be conducted.

AI Declaration

We utilized my intellect to complete the paper, and where necessary (approximately 5%), we consulted AI to inquire about suitable STATA commands to use.

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Social Enterprise Improvisation of Services to the Community Using Mobile Technology

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Abstract: This study investigates the factors influencing the integration of mobile technology and services of Social Enterprise to communities in South Africa. Following the interpretive approach, we conducted a qualitative study involving semi-structured interviews with SE employees and members of a community in South Africa. Our analysis revealed seven key factors: connectivity, network infrastructure, capabilities, affordability, accessibility, contextualisation, language translation, and knowledgeability. These factors interact in complex ways to shape the integration of mobile technology with SE services in the community. The study contributes to the literature by providing a nuanced understanding of how mobile technology can be integrated with SE services, highlighting the potential implications and consequences. Our findings have a significant impact on SEs, community members, and IT specialists including those involved in policymaking.

Keywords: Social Enterprise, Mobile devices, Case study

1. Introduction

Service delivery remains a pressing issue in communities worldwide (Masuku & Jili, 2019). Many communities are not receiving the much-needed services, while poverty and unemployment remain pressing issues. Governments in many countries have undertaken the responsibility to address the service delivery needs of communities (Kosec & Wantchekon, 2020) but have been constrained by resource challenges that have made it difficult to provide these critical services (Thusi et al., 2023). In particular, the South African Government has struggled to fulfil its service delivery mandate to communities (Mathenjwa, 2016). Considering these struggles by governments and social challenges within communities, individuals and groups have grown awareness and responsiveness to address these social challenges, such as unemployment and poverty (Fraizer, 2011), by employing Social Enterprise (SE), to drive social change.

Social Enterprise is described as having a social mission to provide services to local communities by combining its social mission with market-oriented business practice to be self-sustaining and support its social mission (Doherty et al., 2014). The emphasis in social entrepreneurship lies in the word "social" which focuses on the social issues in communities and not so much on "profit-making" as is the case with business entrepreneurship (Malunga et al., 2014). Increasingly, people residing in both urban and rural areas of many countries have access to mobile phones (Singh et al., 2016). Thus, SE seeks to employ Mobile phones to improve the services provided to communities, for sustainable development (Wronka-Pospiech & Fraczkiewicz-Wronka, 2014).

Despite Mobile phones' usefulness, many non-governmental organisations, including SEs struggle to integrate the ICT solution (mobile technology) as a tool to improve their service delivery to the public (Parthiban & Qureshi, 2020). The integration of ICT into SE in South Africa can especially help make available critical information to the public for participation and decision-making. Making information available through ICT channels is critical for the delivery of services (Kosec & Wantchekon, 2020). Since the most common way of communication is the use of a mobile phone, one needs to consider that many factors influence people's acceptance of mobile technology (Almarashdeh, 2018). The use of mobile devices in the improvisation of services is neither straightforward nor easy, in that many factors influence both providers and recipients of services. Common factors such as user attitudes, perceptions, and beliefs are regarded as determinants that affect technology acceptance (Alharbi & Drew, 2014).

The paper is organised into five main sections. The first section introduces the paper, followed by the literature review. In the third section, the research methodology is discussed. Next, the analysis and discussion are presented. The fourth section provides an integration mechanism for ease of technology use within SE service delivery. The chapter ends with a summary in the fifth section.

2. Literature Review

Within the current economic environment, where funding for socio-economic development is hard to come by, the need arises for organisations to be financially self-sustaining while also addressing social needs in local communities (Chell, 2007). SE drives the idea of self-sustainability and extends the traditional social purpose initiatives of non-profit entities such as NGOs and charitable trusts (Goval et al., 2017). Additionally, Social Enterprise (SE) stimulates economic growth through activities that lessen the reliance on government funding (Lyne, 2017).

In addition to the brief in the introduction section, SE refers to a business that brings about positive social change in an environment (community) (Littlewood & Holt, 2018). SE growth has been exceptional in many regions across the world over the last three decades (Kerlin, 2010). Some of the countries are Japan (Nakagawa, 2015), Germany (Birkhölzer et al., 2015), Italy (Defourny & Nyssens, 2014), and the United States of America (Defourny & Nyssens, 2012). SE's growing practices are fuelled by the quest for sustainability (Alter, 2007). Therefore, social enterprises are self-sustaining and entrepreneurial in their endeavours (Chell, 2015). The idea of SE is self-sustaining because it seeks to achieve social missions through business ventures (Gonin et al., 2012). In many parts of the world including South Africa, SE brings many vital innovations and crucial services to marginalised communities within the country (Chikadzi, 2014).

SE employs information and communication technology (ICT) to enable and provide services to communities. Primarily, ICT is applied widely in fields such as healthcare (Zonneveld et al., 2020), agriculture (Spielman et al., 2021), and community development. Increasingly, ICT solutions such as mobile technology are employed for community development as it has become a more effective enabler for community engagement (Ingrams, 2015). Mobile technology solutions include mobile cellular phones, personal digital assistants (PDA), video game consoles (e.g. PlayStation Portable), smartphones and tablet computers (Free et al., 2013). Since its adoption in 1990, mobile phones have evolved, and we now have smartphones that have become part of everyday life (Kakihara, 2014).

3. Methodology

We employed a multiple case study approach, selecting an SE and a community in South Africa. A set of criteria was used for the selection. This approach allows for in-depth exploration of the phenomenon within its real-life context (Yin, 2011). Semi-structured interviews were conducted with a total of 25 participants: 15 and 10 from the SE and community, respectively. The interviews were stopped at a point of saturation. The participants were assigned pseudonyms, and they included users, managers, project coordinators, IT specialists, fieldworkers, and members of the community. The interview data were analysed using thematic analysis.

Subjective reasoning is employed in the interpretation of the findings. Primarily, the subject approach was selected for three reasons. First, it is a qualitative study allowing for an interpretive approach. Secondly, it enables the researcher to construct meanings socially (Maines, 2000). Thirdly, with the approach, new insights can emerge and be induced into the phenomenon being studied. Also, subjectivity leans toward interpretivism because people see things differently within their lived experiences (Iyamu, 2020).

4. Findings and Discussion

Thus, the findings were viewed from different consequential and implicative standpoints, and meanings were constructed. In constructing the meanings, technical and non-technical perspectives were the focus, on how services were improvised to the communities using mobile technologies. This was geared towards two: to gain a deeper understanding of the contribution of SE to communities, and for a better comprehension of using mobile devices, to facilitate and enable the ease of access to information and service distribution. Seven impact factors were highlighted in the analysis. The factors were categorised into technical and non-technical factors that influenced how SE and community members use technology to share important information related to service delivery. The technical factors are connectivity, network infrastructure, and capabilities. Non-technical factors include affordability (cost-effectiveness), accessibility, contextualisation, language translation, and knowledgeability. The technical and non-technical factors depend on each other and are inseparable in their use to improvise services to the community.

4.1 Connectivity

Connectivity has been used as a metaphor to study interactions enabled by digital technologies for many years (Aljabr, Petrakaki & Chamakiotis, 2024). In the context of this study, connectivity refers to the ability to connect entities, humans and services using technology solutions such as mobile devices to share and access information. This means that connectivity can be via mobile data or Wi-Fi. SE improvise service delivery by sharing important information using technology solutions, including WhatsApp, short message services (SMS) and electronic mail (email) applications. Connectivity thus means that SEs who provide a service to the community can connect via a service provider to distribute information to the community.

Connectivity happens using mobile technology, which plays an important role when it comes to information sharing. According to Sonnad et al. (2022), organisations employ electronic systems to connect and interact with other systems. Most community members have access to a mobile device, which allows them to benefit from the services provided by SE. Those who are connected to the services can share information with others in their community either through word of mouth or by passing on WhatsApp messages. The improvisation of service using mobile technology by SE and community members reaches many in the community. People who do not know about the services now also have access to information as it is being passed on by those who receive first-hand information (through attending training).

4.2 Network Infrastructure

Much emphasis is placed on the impact of telecommunication network infrastructure towards digital transformation and quality of services in developing countries. The cost and quality of services provided to mobile users by internet service providers (ISPs) are dependent on proper network infrastructure, which includes fibre optic cables, data centres, and mobile phone towers (Inusah et al., 2024). Within the context of this study, network infrastructure means the systems and physical components that enable connectivity between computers and mobile devices for communication and information-sharing purposes. Network infrastructure has an impact on the quality of communication and information distribution between SE and community members who rely on mobile connectivity to access the distributed information. Network downtime is often the result of network infrastructure components that are failing or being stolen, such as mobile phone tower batteries. Network downtime refers to the interruption of access to systems, services, or applications due to hardware failure or power outage (Dzedzy & Ayyub, 2024).

When adequate Network infrastructure is not in place, which is sometimes the case within low-income areas, people experience poor internet connectivity, as empirically revealed in this study. Poor internet or mobile connectivity negatively impacts the services provided by SE to the communities because they use mobile technology. Sometimes, cellular phone towers are affected by electricity interruption and internet, or mobile connectivity is interrupted. This has an impact on the availability of information as well as the inability of fieldworkers to share or store critical information online.

4.3 Capabilities

Regarding sharing information and providing learning opportunities through training events, mobile technology is regarded as a crucial tool in providing quality services (KR et al., 2024). The features and capabilities that mobile technology, such as smartphones, provides can potentially increase productivity in rural and urban farming communities (Tulinayo et al., 2022). Features and capabilities within messaging applications such as WhatsApp and text readers allow for quality communication between service providers and community members and between community members. The technical factor of capabilities is important in this study as it relates to what people (service providers and recipients) can do using their mobile devices, which enhances their communication and economic status.

The enabling capabilities and features within mobile technology can result in quality communication between SEs and the communities they are serving. Sharma et al. (2021) discuss the importance of mobile capabilities in providing higher data rates for improved communication. The point of higher data rates for improved communication is also emphasised by Agrawal et al. (2015) when discussing how wireless network technologies have evolved from first-generation (1G) to fifth-generation (5G) technologies. Service providers and recipients benefit when information can be accessed seamlessly using enabling capabilities. These benefits include greater participation in creating new content and information (Emeana et al., 2020). The community can use social

media platforms to share their experience and exchange best agricultural practices (e.g. how and where to grow crops and sell produce).

4.4 Accessibility

There is a strong relationship between access to the Internet and economic development. Accessibility within the context of this study refers to how information and activities are made available, reachable, and usable for those who need to benefit from the available information and services. Emeana et al. (2020) note the need for accessibility, which includes access to mobile devices and network coverage which supports the distribution of agricultural information. This means that the information distributed to farmers and community members needs to be accessible so that they can benefit from it. As noted by Al-Sakran and Alsudairi (2021), this accessibility also refers to the platforms where the information is distributed and the format in which it is shared.

Lack of access to advanced technologies such as smartphones, coupled with limited internet access, are factors that work against accessibility to important information. Mapiye et al. (2023) note these limitations while stressing the need for device capabilities to support information accessibility. Accessibility is also limited by the lack of digital literacy, which relates to the understanding and knowledge to use information presented in multiple formats on an electronic device (Pangrazio et al., 2020). Accessibility in the context of this study also refers to the ability of the community members to navigate to content using their mobile devices (e.g. smartphones). SE should thus ensure that the information and content they share are accessible by targeting different users of devices.

4.5 Contextualisation

The distribution and accessibility of information often need to be tailored to fit within the context or domain within which the users or recipients find themselves (Kaipia et al., 2017). To enhance the relevance of information, much must be understood about the users and the environment they find themselves in. For SE it thus becomes important to know the community they are servicing so that they can provide contextualised and relevant information.

Context is described as the connection of cultural, spatial, and political influences, amongst other factors (De Bruin et al., 2023). SE thus improvises its services by distributing information within the context of what the community needs. Many of the community members have a farming background. This is coupled with their need to be sustainable and use the available land to their advantage, such as growing crops. Information will make sense to them when contextualised around community members' lived experiences. Contextualised information implies that community members get value from the services that are provided to them. The information the community receives leads to productive farming and sustainable living while also addressing malnutrition. The community members become co-producers of knowledge and information because they, understanding the context, share the information with others in similar settings.

4.6 Language Translation

Research shows that many factors hinder communities from benefiting from technological interventions to improve livelihoods within developing countries (Alao et al., 2021). Low levels of literacy and language barriers are among the hindering factors impeding the use of technologies like the Internet and mobile devices for information sharing. Language translation is therefore important to gain maximum benefit from information distribution. The language used by people within a specific grouping or culture carries meaning that is particular to the cultural setting. Language translation in the context of this study is making sure that the terminology used aligns with people's conceptualised thoughts, feelings, and behaviour as noted by Cambell and Young (2016). In their improvisation of services, SE should thus ensure that the terminology they use is understood by their target audience. The process of translation, according to Corina (2021), ensures an accurate rendering of meaning from one language (the source) to another (the target).

The SE that provides services to the farming community needs to ensure that when distributing information, it is understood and contextualised. If language translation does not take place, it can lead to a breakdown in communication based on cultural or educational grounds. Language translation is thus important to ensure that content is correctly presented and that it becomes useful to those for whom the information is intended. This leads to greater participation and richer content creation by both service providers and the community.

4.7 Knowledgeability

For many people and communities, knowledge and skill come through informal learning over many years. Knowledge, in turn, is defined as having an awareness or familiarity of something (or skills, descriptions, etc) which has been acquired through experience, discovery, or learning (Fidelugwuowo, 2021). This means that, apart from formal learning, people have some knowledge base developed through their daily activities. This provides them with a basis for being able to search for new knowledge. Knowledgeability within the context of this study refers to people’s understanding of things and concepts within their living environment, enabling them to engage with content and processes.

For SE, the community members need to have some basic knowledge and understanding of their environment and the challenges they face. For example, community members are faced with challenges like food security and unemployment. They do things that supplement their income and provide nutrition. Knowing the challenges they face leads them to look for ways to improve their livelihood. The improvisation of services by SE thus targets community members wishing to learn more about farming, income generation and food security. When the community is knowledgeable, it makes it easy for SE to provide ongoing service to the community. The community becomes appreciative of what they learn through the training provided because they can put the things learned into practice. Enhanced communication based on knowledgeability between SE and the community leads to new knowledge and understanding.

5. Integration Mechanism for Ease of Technology Use

The findings discussed above focused on how the technical and non-technical factors could be employed by SE to improvise its services to communities using mobile devices. Figure 1 illustrates how the technical and non-technical factors are interconnected to influence the integration of mobile technology with SE services. arrows are used to show the relationships and interconnectedness. These findings provided us with the key elements that need to be addressed for SE to effectively deliver service to communities through mobile technology. These key elements form part of the framework as an integration mechanism for improvising services to communities through mobile technology. The framework also shows the relationship between the various factors and how they impact each other.

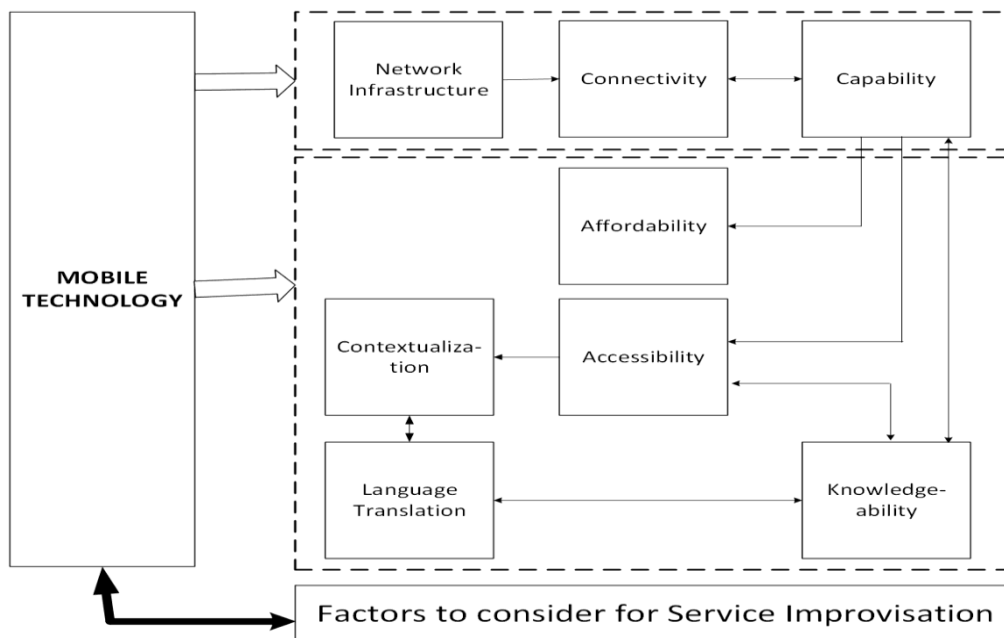


Figure 1: Integration mechanism for ease of technology use

5.1 Network Infrastructure and Connectivity

As noted above, network infrastructure is critical for providing internet connectivity to mobile technology users. Research shows that Internet service providers (ISPs) depend on network infrastructure to provide Internet access to many Internet subscribers. ICT has proven to be a key contributor to socioeconomic growth in developing countries and depends on installing proper network infrastructure. Without the infrastructure, ISPs

also struggle to provide connectivity to users and thus hinder proper communication, which needs to happen for socioeconomic growth. There is, thus, a relationship between the availability of network infrastructure and internet connectivity.

The distribution and sharing of information to the community for community development starts with properly installing network infrastructures, a function performed by telecommunication agencies, government, and regulatory bodies (Rey-Moreno & Pather, 2020). There must be a greater prioritisation of network infrastructure in areas that need internet connectivity for the distribution and sharing of information that is critical to community development. Prioritising network infrastructure can lead to greater participation in content development and the distribution of information, which means that community members are in a better position to grow socioeconomically.

5.2 Device Capability and Affordability

There is a link between connectivity and mobile device capability. Mobile devices are built with connectivity in mind because they have evolved into more than just a communication tool; they are tools with which people do many of their daily tasks (Hartanto et al., 2023). For many of these tasks, there is the capability to retrieve and store information online. The mobile device should thus be able to access the internet and other internet-enabled services. Mobile device capabilities, therefore, play an important role in SE's distribution and sharing of information to communities.

Another capability aspect that affects SE in their service delivery (such as the distribution of agricultural information) is the software that can be installed on mobile devices. Messaging and communication software like WhatsApp is a platform that is used by most for sharing information (Dahdal, 2020). Not all mobile devices have the latest capabilities to read content, nor are they compatible with the latest messaging services. For example, content is sometimes distributed in Portable Document Format (PDF), which allows users to read the content only (and not modify it). Thus, community members must have access to mobile devices that have the required capabilities of both distributing and accessing content on their phones.

The affordability of the latest mobile devices has become a challenge for many community members seeking to use the services and information made available by SE. In addition to sending out messages and content that is only readable by smartphones, SE must also concentrate on using bulk SMS services. In this way, anyone can have access to the shared information. Most phones also allow users to send and receive multimedia services (MMS), which allows images to be distributed in this way. Focusing on reaching the wider community is a priority in information sharing. SE will thus use multiple channels to distribute information, including WhatsApp messaging and SMS / MMS.

5.3 Accessibility and Knowledgeability

Much has been written on equal access to information and how that increases economic development (Chatterjee, 2020). Accessibility speaks about people's ability to access and retrieve shared information. Information being distributed should thus be accessible and in a format that can be read by those who access the information. There is thus a link between device capability and accessibility, and both are important in information sharing.

SE needs to ensure that community members have mobile devices that can access information and that the community knows how to access the information. A person might have mobile devices with the right capacity but not know how to access the information. Knowledgeability in this context means that the community knows the information they need is available and knows how to access it. Not knowing about the available information and not knowing how to access the information are both limiting factors for service improvisation. Training sessions should include the content and the means to access the information. When farmers know how to use their mobile devices to access important information, they participate more in information distribution. This can lead to the stimulation of socioeconomic growth through participation in knowledge sharing.

5.4 Contextualisation and Language Translation

Shared information requires relevance, specificity, and a detailed background. These are some of the characteristics of contextualised information (De Matos et al., 2020). Without relevance, for example, little value can be extracted from the information being shared. SE must make sure that the content is of value and that the

community can engage with the content that is being shared. When the community can relate to the information being shared, it leads to greater participation and engagement.

Language translation is required for effective communication of contextualised information. In sharing information, SE must make sure that they use familiar terms. Regional farmers might use specific terms relating to their farming practices. The language translation is thus not limited to the language but also includes the terms used. Proper translation of the information leads to greater comprehension, and the improvisation done has a greater impact on the community.

6. Conclusion

This study contributes to the literature by identifying key factors influencing the integration of mobile technology with services of SE to the community, and by demonstrating an understanding of this complex phenomenon. Practically, our findings suggest that SEs need to focus on training and gaining insights from both technical and non-technical factors to integrate mobile technology with their services. Future research could explore these issues in other cultural contexts or investigate the long-term impacts of these technologies on SE services, including policy development.

Ethics Declaration

Ethics clearance was required for this study. The Cape Peninsula University of Technology (CPUT), which oversaw the study, granted permission for it.

AI Declaration

No artificial intelligence tools were used in this paper.

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Navigating Positionality in Economics and Management Research: Ethical and Practical Considerations

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Abstract: Positionality in research refers to where the researcher stands relative to “the other” at a particular moment in time and space, and is sometimes described as the researcher being an insider or an outsider. However, it is a complex and multifaceted concept and also takes into account the type of research being conducted, the phases of research, the dynamic context of the research setting, and the social construction of the identities and personae of individuals. Researcher reflexivity is required before, during, and after the research process to deal with the ethical and practical issues associated with positionality. The concept of positionality is well-established in some disciplines but has typically been given less consideration in economics and management studies, even though ethical and practical concerns related to positionality may arise. This neglect is also evident in there being few research studies exploring how positionality is navigated in these disciplines. This research addresses this neglect by presenting an example of how a multidisciplinary economics and management research team dealt with an incident of dynamic positionality. The aim is to illustrate how a research team applied reflexivity to dynamic positionality during research on a business incubation project, where the NGO within which the research was being undertaken provided far greater access to data than initially envisaged by the research team. Using a combination of reflexive procedures and principles as the research method, an illustrative case study is produced, describing the reflexivity of the research team and how they adjusted their positionality. The study identifies ethical and practical considerations in shifting identities, roles and positionality, highlighting the importance of reflexive practice in economics and management research. It also illustrates the value of combining four levels of positioning with various positionality personae into a framework to inform the reflexive practice of a multidisciplinary research team.

Keywords: Positionality, Outsider-insider Research Continuum, Reflexivity, Ethics, Positivist Research

1. Introduction

Matters related to the positionality of the researcher are well established in many disciplines, with the idea having its origins in, for example, discussions of situated knowledges (Haraway 1988) in feminist research, critical race theory in legal studies (Milner 2007) and ethnographic research in the disciplines of anthropology and sociology (Fleming 2018). It is also prominent in multicultural and postmodern research and studies adopting participatory approaches (Merriam et al. 2001).

The application of positionality to economics and management studies is less developed, particularly amongst those researchers who are more positivistically inclined in their research approach. However, the positivist's assumptions of objective knowledge are contested by assumptions of situated knowledges (Haraway 1988), which acknowledge multiple ways of knowing and the incompleteness of knowledge, compelling the researcher to reflexively consider how they collect and interpret data (Caggiano & Weber 2023). There have also been calls for all researchers to give more careful attention to positionality, irrespective of their research approach (Collins & McNulty 2020), including quantitative researchers (Jamieson et al. 2023). Researcher reflexivity is vital to guide matters of positionality. The aim of this paper is to illustrate a research team's reflexivity in applying a combination of perspectives of positionality to a research project.

2. The Insider-outsider Researcher Continuum and Positionality

In every study, based on the closeness of the researcher to what is being researched, researchers adopt a position along a continuum from outsider to insider (Fleming 2018). The researcher has traditionally been described as an insider if they are a member of the organisation, group or community being researched, while an outsider-researcher is not, and consequently has no a priori knowledge of the research setting (Fleming 2018). Insider-researchers, therefore, have a “lived familiarity” with the group being researched (Mercer 2007). As already alluded to, in many instances, insider-researchers have this status by virtue of their membership and will have to navigate their role duality of being both a member and a researcher (Brannick & Coghlan 2007). However, in other cases, the lived familiarity of the researchers is not about membership. Instead, it arises because of having biographic characteristics similar to those of the research participants, such as race or gender (Mercer 2007), which promotes researcher identification with the research participants (Bruskin 2019).

The insider-outsider researcher continuum is part of the more complex set of considerations about researcher positionality. Positionality in research refers to where the researcher stands relative to “the other” at a particular moment in time and space (Bayeck 2022, Merriam et al. 2001) and is, therefore, contextual and dynamic in changing research settings (Caruana & Montgomery 2015), influenced particularly by the research context and the researcher’s interaction with organisation members (Bruskin 2019). Furthermore, positionality is multi-dimensional, as several identities of individuals are simultaneously being socially constructed and influence the position and perspectives that researchers adopt as they experience and socially construct their world (Bruskin 2019, Kezar & Lester 2010).

While a researcher’s positionality may be assumed either deliberately or without much consideration, it can potentially affect many aspects of the research design and process (Fleming 2018). For example, there are several ethical considerations unique to insider-researchers, including their (1) pre-understanding of the research setting, (2) accessing data and matters of consent, anonymity, privacy and confidentiality (3) the risks associated with organisational politics, including power relations and perceptions of coercion and marginalisation by the researcher (Brannick & Coghlan 2007, Fleming 2018). In considering the positionality of the researcher vis-a-vis research participants, interrelated issues of power and representation cannot be ignored (Merriam et al. 2001, Ríos & Patel 2023), particularly in participatory approaches to research or those dealing with sensitive subjects. This obligates researchers to uphold an ethic of care (Reich 2021), and to share their research findings with participants (George et al. 2023). Equally, the potential benefit and harm to the researcher must be acknowledged. On the one hand, the insider-researcher’s positionality can make them vulnerable as they open up both themselves and their ideas to criticism and potential harm, but on the other, it could be a source of credibility and authority, allowing research participants and readers to identify with and connect with the researcher and their work (Massoud 2022).

3. Researcher Reflexivity, Positionality and Personae

It has been recommended that reflexivity can be helpful for researchers to navigate their positionality, particularly when becoming insider-researchers (Bonello 2021, Bukamal 2022). Collins and McNulty (2020, p. 210) state that “Reflexively considering one’s research persona at the outset of a project, as well as reassessing it during data collection and analysis, can help researchers articulate the assumptions of positionality likely to be made by themselves as well as others ... [and] can also assist in providing a clearer understanding as to how one’s persona may change over time ... and via what process.”

Reflexivity involves “thoughtful, analytic self-awareness of researchers’ experiences, reasoning, and overall impact throughout the research process” (Råheim et al. 2016, p. 1). It is about the “conscious, active acknowledgement of one’s own belief, bias, and judgement systems *before, during, and after* the actual research process” (Jamieson et al. 2023, p. 2). Furthermore, in his framework Milner (2007) proposes that researchers consider positionality at four levels, which he referred to as (1) researching the self, (2) researching the self in relation to others, (3) engaged reflection and representation, and (4) shifting from self to system. This framework has been shown to help researchers assume developmental and transformational roles concerning their positionality (Lu & Hodge 2019).

The positionality of researchers is determined by their reflexivity and action, and the perspectives and perceptions of the research participants also shape positionality. Drawing on role-based identity theory and considering both researchers’ and participants’ salient shared identities, Collins and McNulty (2020) propose four researcher personae: the *intruder*, *fellow*, *stranger* and *guest*. The researcher *intruder* feels like an insider but is viewed by the research participant as an outsider who is, therefore, likely to be less willing to share sensitive information with the researcher. On the other hand, the researcher *guest* feels like an outsider but is treated by research participants as an insider. In contrast, the views of the research and research participants are aligned with both parties recognising the *stranger* as an outsider and the *fellow* as an insider. The stranger could have difficulty building rapport with participants but is more likely to be perceived as a neutral outsider (Collins & McNulty 2020). Alternatively, being positioned as a fellow demands more transparency and reflexivity from the researcher during analysis, as ethical dilemmas are likely to arise from the privileged data they have access to, and from the ambiguity of their role as researcher versus member (Collins & McNulty 2020).

So far, few studies have applied the personae developed by Collins and McNulty (2020). Only two studies were found that have referred to personae, namely (Mahadevan & Moore 2023) and (Stoten 2024). Mahadevan and Moore (2023) refer to the work in explaining how to self-assess choices in ethnographic research, developing an ethnographic triangle that examines the reflexive engagement of ethnographic researchers with actors (or

research participants) and their audience (i.e. readers of their work). Stoten (2024) investigated the teaching and learning experiences of academics. He explains how “heutagogy places the learner at the centre of the learning journey through a negotiated curriculum in which the nature and scope of the learning experience are determined by the individual” (Stoten 2024, p. 993). He further explains that even though he had published research on heutagogy and the curriculum of business schools when conducting research with fellow Business School academics on their teaching and learning, he deliberately did not present himself as an advocate of heutagogy so as to more effectively access their personal understandings of teaching and learning.

Researchers have recognised the fluidity of the researcher’s role (Bruskin 2019). However, compared to situations of researchers applying positionality to sensitive research topics and engaging with cautious research participants, less attention has been paid to positionality in research situations where participants demonstrate increasing openness towards outside researchers. Stated differently, research on the dynamics of the development of a change in persona from stranger to guest, and guest to fellow has been neglected.

4. Research Methods

The research method can be described as a combination of reflexive procedures and principles. The research team engaged in self-reflexivity (Cunliffe 2003) and epistemic reflexivity by constructing a thinking task for themselves (Guttormsen & Moore 2023) on the meta-theoretical (Weber 2003) assumptions of the research project and their implications. This thinking task involved applying the personae developed by Collins and McNulty (2020) to the four levels of positionality (Milner 2007) during the research process (Jamieson et al. 2023), to consider the impact (McKenzie & Bartunek 2023) of the researchers’ positionality. As a form of reconfiguring practice (Hibbert et al. 2019), we first explored possibilities and their implications and then reorientated our focus. We explored our research approach and its implications for positionality through a responsive dialogue about a critical incident (McKenzie & Bartunek 2023). The dialogue took place through conversations and written exchanges, and the outcome is presented in the form of an illustrative case study. The illustrative case study in this paper explains how, after identifying potential insights and solutions that could address some of the strategic challenges the organisation was confronting, the researchers deliberated on whether to get involved in sharing these insights and advice and how to do so in a way that upheld the collaborative partnership that had developed, while also retaining their primary identity as researchers.

5. The Illustrative Case Study

5.1 Background to the Illustrative Case Study

One research team member met the CEO of the South African Creative Industries Incubator (SACII) when they were both panel discussants at a conference organised by Entrepreneurship Development in Higher Education (<https://edhe.co.za/>). The meeting was informal and on a level playing field, with both participants acknowledged as experts in their respective fields. From a casual conversation ahead of the panel discussion about current projects, the idea of combining the VFX pilot study being run by SACII with the research expertise of an academic team was suggested. This was followed up in later days by emails further discussing the project and one member of the research team meeting with SACII at their offices in Cape Town. Thereafter, a research team was formed, with their first research project focusing on the economic and management aspects of an incubator set up by SACII to develop VFX specialists.

Key partners in the VFX incubator were SACII, E-squared Investments (<https://www.esquared.org.za/>) as a funder of the project, and Lightseed (<https://www.lightseed.co.za/>), a private company providing VFX solutions to the film and media industry. The VFX project arose because of a global shortage of VFX specialists recognised by Lightseed, who found themselves increasingly outsourcing VFX work to suppliers in other countries. Lightseed initially attempted in-house training but had low completion and success rates. They approached SACII because of their expertise in social entrepreneurship in the creative industries and business incubation. The VFX accelerator programme aims to develop a pipeline of work while simultaneously recruiting and training talented creatives. An innovation of the project’s design was that, during the two years of their internship, the trainees are expected to “earn as they learn” through bidding for gig work via online platforms. They were also paid a stipend, designed to reduce over time as their earnings were expected to increase. A portion of the student’s earnings was also to be retained and used to fund future training rounds.

The purpose of the research was to describe and analyse the innovative way the partnership aims to develop a sustainable digital creative industries ecosystem through a social entrepreneurship approach. Specific objectives

include (1) explaining the project's origins and partnership development, (2) describing the conceptualisation and implementation of the project, including the recruitment, training, and deployment of trainees, and (3) analysing the nature and effectiveness of the project as a social enterprise, including the roles of the partners and experiences of trainees. One particular focus area of interest was the mechanics of the stipend as an economic incentive.

From the start, a collaborative relationship was established between SACII and the researchers, focusing on producing mutually beneficial outcomes. The research team led the articulation of draft research questions for interviews, focus groups, and a questionnaire, which were shared with SACII and edited and shaped by them through comments made on the document and in online meetings. The development of relationships and trust in the pre-research phase of the work was thus instrumental in how much access the research team had to the SACII incubation processes and data, and it was in the pre-research phase of the project that the research team was invited to attend weekly SACII meetings for the VFX incubator project.

The access to the weekly planning meetings served several purposes, even though the research team members did not participate in the meetings other than through greetings at the start. Firstly, the research team's understanding of the VFX project – its aims, the practical details of how it was run, and discussions between the SACII team – was greatly enhanced beyond what could have been gleaned from document analysis only. Secondly, the individual roles and expertise of the SACII team became clearer, helping to shape the interview strategies of the research team. Thirdly, it allowed the tracking of the project in real-time so that the research team was aware of successes and challenges as they emerged, rather than reading about them afterwards.

5.2 The Researchers' Dilemma

Data was collected through interviews, questionnaires, focus groups and document analysis. In addition, after the research team was invited to attend the weekly online meetings as observers, they were given access to all recordings and minutes of meetings. This level of access was not anticipated when the research project was first conceived but reflected the NPO's level of transparency and the nature of the collaborative relationship that had been established. During the early stages of data collection, one of the researchers who had been attending the meetings described how SACII grappled with how they should manage the expectations around the phasing out of the stipend. Due to a downturn in the creative economy, trainees' earnings were not as high as anticipated, and they were, therefore, very reliant on the stipend. SACII was also considering how to manage expectations for the new cohort of trainees to be recruited in the project's second year.

When further investigating and discussing this matter, the researchers recognised several concepts in the literature that provided different perspectives on the problem the NPO was trying to solve. The conversation developed to consider if, when, and how to intervene by providing the NPO with these insights. Several ethical and pragmatic considerations were deliberated upon.

5.3 Ethical and Pragmatic Research Considerations and the Intervention

Firstly, the research team considered the implications of any intervention on their positionality. Even though they had been provided greater access to the research site by being invited to meetings, they had observer status at these meetings and were not participant observers. They recognised that sharing these insights could alter their observer status at these meetings, and they could be drawn into more extensive discussions and feel compelled to adopt an advisory role in the project. The research team discussed the implications of this for their evaluation of the project that formed part of the broader set of research goals, particularly their neutrality. This included discussions about the research traditions of the research team in terms of their disciplinary backgrounds, including ontology, epistemology, and positionality. They also recognised that an intervention may require renegotiating their observer status with SACII and applying for an amendment to the ethics application that had been approved by their university. On the other hand, they recognised that the research relationship with the NPO was for mutual benefit and that withholding or delaying the sharing of critical information could have adverse consequences for the incubation project and the collaborative relationship. Just as SACII has let the researchers into their organisation context by providing access to data and meetings, the researchers agreed that they would reciprocate by inviting SACII into their "world" of data analysis.

Secondly, once the research team had agreed that it was right to intervene, they considered the format of the intervention. Several possibilities were discussed, and ultimately, the intervention occurred in two stages. Initially, articles introducing the concepts the researchers had identified were shared with SACII's CEO. Shortly thereafter, these concepts were applied to create a sample communication brief on the issue of stipends, which

was also sent to SACII's CEO. In other words, the intervention occurred outside the regular SACII meetings where they were observers.

5.4 The Outcome of the Intervention

There were two primary outcomes of this intervention. Firstly, the NPO appreciated the timely and relevant intervention by the research team. In an email, the SACII CEO wrote, "This is definitely very helpful". The research team also asked for permission to write about this incident, to which the SACII CEO responded, "This sounds good to me. ... Part of my excitement about this research project I think, was that the research report would give us some kind of mirror to reflect back to us ... so critical reflection is so needed, and I think this is what your observation provides".

Secondly, after the intervention, the research team could retain their observer status at these meetings and noticed a change in how the stipend was discussed by SACII. In the meetings, the CEO did not directly refer to the articles or the communication brief the research team sent. However, there was a shift in her discourse when discussing the responses of the trainees to the termination of the stipend. In the meetings, it was evident that SACII was aware that the amount of work and remuneration envisaged at the start of the project had not been fully met. Initially, responses had been somewhat defensive, highlighting that trainees were not promised that earnings would entirely replace the reduction in the stipend and that their sense of entitlement to and dependence on the stipend was a problem. Later on, there was a greater acknowledgement of the very real struggles of the trainees, emphasising their changed position after year 1 (access to training and equipment) but facing the realities of the gig economy. That work would be erratic and dependent on the market and available contracts.

Having reverted to their research role and observer status at meetings, the research team recognised that should they be able to contribute to any future problems related to the VFX project that SACII was grappling with, they could readily intervene, and they were confident SACII would welcome this.

6. Discussion

This paper presents a case study where a team of economics and management researchers had initially positioned themselves as outsider-researchers (Bayeck 2022) or strangers (Collins & McNulty 2020). However, the organisation being researched was very open to their involvement and provided far greater access to data than initially envisaged, including observer status at their regular meetings. Because of this access, the researchers' personae began to develop as guests and even in the direction of fellows (Collins & McNulty 2020). As a result of their access to meetings, the research team became well-informed about some of the strategic decisions the organisation was grappling with. That is, access to the weekly planning meetings was instrumental in the research team's ability (and decision) to intervene. Therefore, this case study illustrates how the quality of the relationship between researchers and research participants determined the outcomes and mutual benefits arising from research activities.

Secondly, the case illustrates how the multiple identities of the researchers were socially constructed and influenced their positions and perspectives (Kezar & Lester 2010) as they consciously expanded their roles to include a secondary role of advisors. Being perceived by research participants as insiders enhanced the credibility of the research team, helping them to shift into the role of advisors and enabling research participants to connect with the advice given (Massoud 2022).

Thirdly, the importance of reflexivity in guiding researcher positionality (Jamieson et al. 2023, Råheim et al. 2016) has been illustrated. From the perspective of the framework developed by Milner (2007), the case illustrates all four levels of positioning. In their discussions, researchers researched the self through critical self-reflection of their assumptions of research and the implications for their positionality. Milner (2007, p. 395) explains that researching the self "can bring to researchers' awareness and consciousness known (seen), unknown (unseen), and unanticipated (unforeseen) issues, perspectives, epistemologies, and positions." Secondly, in researching the self in relation to others, the researchers reflected on their own research interests versus the interests of the research participants. This was reflected in debates about what made for good research practice versus what was in the best interests of the incubation project and the collaborative relationship with SACII. Thirdly, the level of engaged reflection and representation was evident in developing the communication artefact for SACII. Finally, there was a shift from self to system when the researchers considered the economic realities of the creative industries when formulating their proposed communication brief.

Finally, the case illustrates the value of reflexivity when conducting research in a multidisciplinary team. That is, researching in a team creates opportunities for responsive dialogue (McKenzie & Bartunek 2023) from multiple perspectives and thereby facilitates reflexivity (Råheim et al. 2016). It also illustrates the complexity of multiple identities of multiple researchers and the potential synergies that can arise.

7. Conclusion

The study highlights the importance of reflexive practice in research teams, particularly in considering matters of multiple identities and positionality, recognising that they are shaped by the interaction of researchers and research participants to create dynamic personae. The personae described by Collins and McNulty (2020) helped articulate positionality as part of researcher reflexivity. The case also illustrates the relevance of positionality in economic and management studies and the importance of including the perspectives of researchers and research participants informing positionality. It is recommended that other researchers use these personae in their reflexive research practice. The case also emphasises the multidimensional and fluid nature of the researcher's role and identity (Bruskin 2019). The four levels of positionality, as proposed by Milner (2007), complemented the personae of Collins and McNulty (2020) in providing researchers with a robust framework, and creating a helpful thinking task for reflexivity (Guttormsen & Moore 2023). The setting of the study was also outside of critical race research, illustrating the broader application of Milner's (2007) work. Finally, the research was unique in presenting a case of researcher self-reflexivity about positionality in a situation where research participants were very willing for researchers to be insiders. It is hoped that this paper encourages more reflexivity about positionality in economics and management research studies and, in particular, in response to critical incidents that arise and affect the research and relationships between researchers and research participants.

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Teaching Research Methods in a Changing World: Responding to Generative Artificial Intelligence

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Abstract: While the tools associated with Generative Artificial Intelligence have evolved over some years, they have become widely used and entered widespread public consciousness since 2022. Generative AI has an immediate impact on Higher Education because of its effect on many of the skills that students need to acquire. Immediate responses to the availability of Generative AI have focused on concerns about student cheating and about the need to design its inappropriate use out of assessments. While the discussion of how it affects learning and teaching has moved on to recognise that students do need to understand how Generative AI can be used there is still limited appreciation of where it fits into the teaching of research methods. Generative AI, used carefully and appropriately, can be applied as a research tool and as it evolves it is likely that new opportunities for its use will emerge. Research typically entails a measure of independent work and scholarly writing by students. Generative AI can create wording which, at least superficially, can appear to a reader as professional and fluent but which is often generic and superficial. For a student encountering the need to carry out research for the first time, typically as part of a taught degree course, it can be difficult to distinguish between the legitimate use of Generative AI, for example to assist with creating ideas, and its inappropriate use to produce text which does not reflect research which has been carried out. A useful starting point for discussing the application of Generative AI is to compare it with the involvement of another person. For a student to pretend that something is their own work when it is not, constitutes plagiarism whether the work in fact is produced by somebody else or it is produced by an AI engine. Conversely it would be reasonable to discuss concepts with another person and similarly to discuss them with AI. Framing this introduces some challenges around how to build AI into teaching about research.

Keywords: Generative AI, Teaching, Research Techniques, Adapting to Change

1. Introduction

Generative Artificial Intelligence (GenAI) has created a considerable amount of interest in recent years, and there are multiple perspectives on it ranging from it being presented as a cause for deskilling across many different roles to it being seen as a fad which could be forgotten within a few years. Among all these it is possible to take a pragmatic perspective that this is something which can enable significant social and economic change, and will have a distinct impact on both research and teaching within universities, without expecting fundamental and even apocalyptic outcomes.

Covering research methods within a taught university course introduces some particular challenges because a number of factors are relevant. GenAI has an immediate impact on the teaching of many different subjects, since it introduces new concerns about plagiarism and also makes it more difficult to encourage students to develop independent writing skills. This is especially relevant to teaching research methods given that it is not easily assessed through invigilated closed-book exams and that writing-up is an integral part of the research process.

When students learn research methods they are typically expected to practise research on at least a modest scale. Typically they are encouraged to choose research questions relevant to contemporary issues and in the current climate this means that the impact of GenAI across a range of sectors is a popular area.

Additionally GenAI has the potential to be a tool for research in the future and students need to have an appreciation of this.

2. Methodology

This paper discusses and reflects on the interplay between these factors and what this means in practice for educators. The methodology is reflective and recognises the constraints associated with a rapidly changing subject. The paper is essentially conceptual including a review of relevant literature spanning both teaching and research, and then draws on the author's experience of adapting to the availability of GenAI across a range of sub-disciplines taught within a business school, and also of teaching research methods and of supervising individual students' research projects. It sets out to identify how this specific area of teaching should adapt to the availability and evolution of GenAI and to provide pointers to next steps.

3. Literature Review

Mollick (2024) introduces GenAI with an account of his own experience in late 2022 when ChatGPT had recently been introduced: he asked it to act as his negotiation tutor and was so entranced with the experience and the effectiveness of the tool that he worked through the night to become familiar with it. He therefore posits ‘three sleepless nights’ as the effort needed to get to know GenAI. His discussion of how GenAI is likely to impact many aspects of life ranges across creativity, collaboration, and education. He discusses the potential for AI as a tutor and coach and specifically acknowledges what he terms the ‘homework apocalypse’ caused by a flurry of GenAI-created essays, and the need for educators to consider how GenAI is to be used beyond this stage. While Mollick is bullish about the future potential and importance of GenAI he remains emphatic that this is a tool which complements human intelligence – hence the title of co-intelligence – and not a substitute for it. His work provides a useful framing of the possibilities offered by GenAI although his perspective, informed by his own discovery of the technology, is not necessarily shared by his readers.

GenAI has already had a profound effect on university education. It provides tools and ready access to resources which previously would have needed very significant effort on students’ part. There are parallels with the advent of widespread online materials around the turn of the current century, which meant that a lot of information, much of it specialist, became very easily available, and which opened new possibilities but also placed fresh obligations on students to cultivate abilities to interpret and navigate that data. However GenAI has been specifically positioned as something capable of writing essays with minimal intervention from a student (Sharples, 2022). So in contrast to access to the Internet, which has given students the ability to process and build on richer datasets than those available to previous generations, GenAI has the potential to ‘deskill’ one of the key components of university learning. When surveyed a majority, but by no means all, students say that they use GenAI (Freeman, 2024) and generally had thoughtful and nuanced ideas as to what was and was not acceptable. Notably they were comfortable with using GenAI to discover and explain concepts, and indeed suggesting research ideas, but recognised that they should not submit text created by GenAI in assessments. This sort of analysis typifies much of the initial response to GenAI in educational settings with an emphasis on assessments and integrity: it also tacitly assumes that many students are instrumental and will seek to complete assessments with the minimum effort feasible.

Pratschke (2024) introduces the challenges around GenAI in education through a useful reprise of how AI has developed since the term was first adopted as early as the 1950s, a reminder that the potential for GenAI to have a considerable impact on education was predicted before the release of ChatGPT, and a note that different proponents of GenAI often have contrasting views on how best it should be applied. Her approach is valuable from the Higher Education perspective in moving the discussion beyond a focus on only parts of pedagogic activity such as assessment. She discusses the importance of creating a GenAI ecosystem for education in which humans’ knowledge and skills complements what can be created using GenAI and argues for an institutional vision which, among other things, depends on staff and students having access to tools, a readiness to embrace rapid change, and considering assessment as an integral part of learning. Sallai et al (2024) take a similar perspective presented in blunter terms, arguing that active engagement with GenAI is key to avoiding a situation where it becomes a reason to reduce student learning.

UNESCO produces a useful introductory guide to GenAI in higher education (Sabzalieva and Valentini, 2023) which through being both comprehensive and accessible has considerable value as a basis for universities to determine how to adapt. Based on ChatGPT3.5 and acknowledging that the technology can be expected to improve rapidly beyond what was available to the guide’s authors when written, it takes the reader through some background and some guidance around appropriate prompt engineering for the context. Furthermore it suggests a series of applications of GenAI in university teaching and learning:

- Possibility engine
- Socratic opponent
- Collaboration coach
- Guide on the side
- Personal tutor
- Co-designer
- Exploratorium
- Study buddy
- Motivator
- Dynamic assessor

Newell et al (2024) position GenAI as a 'beneficial disruptor' to higher education, recognising that it can have a profound impact on the way that teaching and learning takes place and, in common with much of the literature that has emerged around the use of this technology, advocating for educators to engage with it. Their approach is particularly valuable as it draws on classic innovation theories, notably diffusion of innovation (Rogers, 2003) and they suggest that most educators (as of 2024) are at a 'persuasion' stage and are still early in their decision-making processes. Miller (2024), taking the perspective of having responsibility for an academic library, and therefore an overview of students' information searching and navigation approaches, proposes a spectrum of red/yellow/green lights to indicate different levels of resistance to use of GenAI – red referring to the most creative and personal processes while green refers to processes which could be seen as laborious and repetitive. A point which is implicit in these perspectives is that this is still a very new technology and the approaches needed to incorporate it into higher education in the longer term may be very different from those needed for a rapid response to its availability. Like Sabzalieva and Valentini (2023) these offer frameworks with the potential to prompt further analysis.

In contrast to many other authors, de fine Licht (2024) makes the case for prohibiting the use of GenAI in certain circumstances, arguing that it is not feasible for either students or faculty members to gain the understanding of GenAI necessary to foster its constructive educational use within a university. He suggests that students are liable only to engage superficially with AI in learning and that they may be unaware of the privacy and data integrity issues associated with its use. He also brings in concerns about energy consumption, and exploitative practices among the creators of GenAI tools, though these are broader issues about the widespread use of these tools and it could be argued that forbidding students from using these tools at university means that they do not confront the issues. Nevertheless, he acknowledges that there are arguments in favour of GenAI being used and students being encouraged to engage with it, especially in a potentially changed landscape in future.

Pallai et al (2024) address the concern that students might adopt GenAI in a way that it becomes a substitute for learning. Their key recommendations include that educators should assume that students are using GenAI, that it is essential to recognise that GenAI is evolving and that the limitations of the current tools are likely not to apply in the fairly near future, and that teachers within universities need to have a good level of understanding of GenAI.

Crompton and Burke (2023) base their findings on a systematic review of literature on AI in higher education published from 2016-2022, so in general just before the advent of GenAI. Nevertheless their findings are instructive with a notable insight that the literature on AI in higher education focused on its use by students in contrast with the equivalent literature for earlier stages in education which focused on its use by teachers. They identify assessment as the most widespread use of AI but also presage the emergence of some GenAI applications notably by mentioning intelligent tutoring systems.

Unsurprisingly, the UNESCO report (Sabzalieva and Valentini, 2023) addresses the potential contribution of GenAI to research as well as to education. Its authors note that a complete research paper could in principle be written by GenAI and that the ethical implications of this remain unresolved. They identify within each of four stages where GenAI could be applied in research:

- Research design
- Data collection
- Data analysis
- Writing up

Notably in the data analysis stage they envisage potential for GenAI to code data and suggest themes, and in the writing up stage they mention including writing quality as well as translation and correct formatting of references and citations.

Burger et al (2023) build an optimistic picture of the use of GenAI in research, focusing on the data analysis stage. It is a useful counterweight to the temptation to see GenAI more broadly as a way of deskilling activities. Notably they posit that GenAI should be able to read source papers more comprehensively and accurately than a human. As scholars of entrepreneurship, and writing at a time when usable ChatGPT had recently become available, they identify the creation of new tools focused on research as an opportunity for new businesses. Among the instances of data analysis where they see possibilities is the creation of systematic literature reviews where the use of correct search terms is crucial and AI can analyse data rapidly and thoroughly. Ngwenyama and Rowe (2024) focus specifically on the literature review process and emphasise the need for researchers to be aware of the limitations of AI and to bring their own understanding and critical abilities to the process. Mollen (2025)

highlights the ethical issues arising from the use of GenAI and argues that approaches to research governance will need to evolve to address these.

4. Bringing GenAI Into Student Research Projects

The impact of Artificial Intelligence – not necessarily GenAI – has been a significant source of ideas for students' individual research projects since 2021. Among the first uses of any form of GPT by a student seeking guidance from the author, was one researching ethical investment. The student experimented with whether an earlier version of GPT (not one which could be considered as GenAI) could provide a more effective balance between financial yield and ethical considerations than a human. From a practical and ethical viewpoint this was little different to any other student project evaluating the use of a new technological tool and in terms of the uses identified for GenAI in research this would count as data analysis.

To provide some background the author teaches in a business school where both undergraduate and taught postgraduate students have some material on research methods built into their course. Typically students are expected to work in small, usually self-selected, teams to carry out a small-scale research project. As this entails a significant element of independent inquiry, the use of GenAI as a guide on the side or as a co-designer of research would be appropriate so long as the completed work reflects the students' own efforts.

Most of these students go on to do some sort of individual project as a capstone for their studies: in a school with multiple courses at each level and various pathways and options there is considerable variation in the way that individual projects run, and not all students do such a project. A principle underlying all of this is that an element of research skill is essential for any sort of business or management career.

A typical research methods module covers how to define a research question, what is needed for a literature review, fundamentals of qualitative and quantitative research, data collection, use of case studies, and coding. In recent years a significant element of using analytics has been added to these modules so students have some understanding of how to analyse very large sets of quantitative data. There is some discussion of research ethics. Team coursework within the module is covered by a general ethics approval for the whole cohort so long as they avoid certain risks. Individual projects do require ethics approval if the students are collecting primary data through interviews or surveys, and a lightweight process is available again so long as they avoid the same set of risks. For example a student proposing to survey people working in casual jobs in hospitality initially suggested including participants as young as 16 to encompass those at school and working during their holidays. By setting a minimum age of 18 the student was able to exclude a category classed as vulnerable and be eligible for the lightweight process.

GenAI initially became a factor in these projects as a topical area for students to study, as with the ethical investment example above. Creative domains such as fashion and the arts are consistently popular with a significant number of students. As part of the training to define research questions, students are encouraged to look for a distinctive perspective or problem affecting a domain which interests them. In an environment where GenAI was getting a lot of coverage in non-specialist outlets and was also promoted as something about which students should need to know, the impact of GenAI on a particular sector became a popular research topic.

Superficially, to a supervisor, the first wave of projects around GenAI seemed very similar to others involving technology adoption over the years. Typically a student would frame their enquiry around a model for change or innovation – diffusion of innovation (Rogers, 2003) being a popular example – use one or more of interviews, surveys, and background reading to learn more about where the technology was being used, and in some cases construct a case study based on what they had discovered. While it was always stressed in briefings that students were not expected to carry out truly original research at this stage, an attraction of using primary data and contemporary issues was that they would produce a distinctive and usually analytical piece of work.

Once these projects were underway it became apparent from supervision meetings that students were engaging more deeply with GenAI than simply writing about it. A few students even qualified the standard wording about the originality of their work, saying that they had sought assistance from ChatGPT or other comparable tools, such as Claude or Microsoft's Copilot (now integrated into the Office software that they used in writing their projects) and stressing that all the wording itself was their own. This formulation would be familiar to most supervisors: it is very similar to the sort of statement included along with an acknowledgement section to qualify thanks being given to peer students or to family members. In principle this is an eminently reasonable use of GenAI – in Sabzalieva and Valentini's (2023) terms it is being used as the guide on the side.

The table below summarises the connection between issues raised in the literature and issues around applying GenAI to teaching students how to research:

	Initial Response to GenAI	Students Researching GenAI	Students Using GenAI in Their Research
Concerns about whether use of GenAI should be permitted	Introduction of clear guidelines and policies for students	Identifying GenAI as an emergent area for research	Guidelines and restrictions on its use
Changes in types of assessment which are feasible and robust	Moving away from conventional essay-type assignments	Developing assignments which allow students to evaluate critically applications of GenAI	Including GenAI among the tools and methods available to students
Use of GenAI constructively as a study tool	Concern about hallucinations especially false references	Encouraging students to explore possibilities	Providing scaffolding for use in categories such as study buddy
Use of GenAI as an aid to research	Concern about its use for writing superficial and inaccurate accounts	Developing awareness of GenAI's potential and limitations	Use in data collection and analysis including in literature reviews

5. Further Discussion

Pratschke (2024) in discussing assessment observes that the important aspect of using an essay for assessment is the process of writing it: without the process there is no learning and this is one of the foundations of her call to integrate assessment ever closer with learning. In the research methods teaching discussed here there is a strand covering the extent to which a research project is distinct from an essay, and even a polished and well-referenced essay would be at best a weak effort if submitted in place of a piece of research.

So an in-depth and closely supervised student project would remain a useful assessment tool because of the intensity of the process and the element of continuous individual learning. Conversely a systematic literature review with limited scope, which historically might have been an appropriate choice for a students looking for a smaller project with an element of research, has become something which GenAI could produce. To make matters worse, a problem with weaker students and large-scale individual independent assignments is that they tend to put together work rapidly at the last minute rather than learning gradually, and relying on GenAI for most of this task would exacerbate that effect.

One response to the limitations of the conventional essay is to develop the concept of a reflective account based on a student's own experience. Creating a narrative account is a valuable research skill and it would be valuable to build instruction in how to do this explicitly into research methods training.

An element of research methods teaching is to explain how to build on existing work and add something which makes it distinctive and reflects the student's contribution. Many business and management students – even those taking post-experience masters degrees – struggle with this in practice and take time to internalise it. A potential approach to adapting to GenAI is to expand this part of the teaching and argue that the same factors that apply when building on work done by another person – paraphrasing, avoiding plagiarism, acknowledging their contribution, applies when building on work done by GenAI. Potentially GenAI could become a co-designer of the student's output so long as the student's intellectual contribution is made clear.

Moving on to discussion of the use of GenAI in research, there are already multiple indications that the range of research methods to which students should be introduced is changing as a result. The incorporation of analytics in research methods teaching is evidence that it is already possible to develop and enhance course content to accommodate new techniques. Within the coverage of quantitative research in particular students are encouraged to learn about analysis software for which enhanced versions are regularly released, and it is important that teaching material is adapted to encompass such updates. Prompt engineering is increasingly a valuable skill for students setting up research activities: building appropriate prompts should be part of research methods training although there is a danger that as universities move to build GenAI awareness into different parts of a course duplication could arise, for example with modules devoted to understanding AI and technological innovation as a whole.

Incorporating GenAI into defining a research question and choosing appropriate methodologies would be in line with Sabzalieva and Valentini's (2023) category of a possibility engine.

Given that the process of writing and researching a project is essential for learning, and usually involves a student working as an individual or small group with a supervisor, then it is essential that supervisors also gain a clear understanding of GenAI. Sabzalieva and Valentini's (2023) categories also offers scope for GenAI to assist some of the supervisor's role notably as a Socratic opponent and as a dynamic assessor. A theme is that GenAI potentially redefines what humans can do and what can be automated and therefore how humans and machines can work together.

6. Conclusion and Recommendations

GenAI is evolving rapidly and many of the current limitations on its utility are likely to disappear. Its effects reach many different aspects of higher education and the teaching of research methods is no exception. Based on the points above the following should be key considerations in teaching research methods:

- GenAI cannot be ignored: it is better to recognise its potential and provide guidance on its use than to prohibit its use by students entirely
- Students should not create work using GenAI and claim it as original: however there are many ways in which GenAI can contribute to their work and they should be encouraged to be honest and transparent about how they have used GenAI and what their original contribution has been
- Educators need a clear understanding of GenAI and need to keep their own knowledge up to date, as should be the case with any emerging technology used by students
- GenAI has the potential both to automate parts of research processes, such as compiling systematic literature reviews, and to enhance the human contribution to other parts, such as coding and data analysis. Assessment and students' individual research projects should be structured and defined in a way that reflects this
- Pedagogic uses of GenAI include providing guidance and managing Socratic dialogues, activities which fit well with what a tutor should do when supervising and providing guidance for research activities. Educators should explore possibilities for this
- While the availability of GenAI changes the way that humans interact with machines, it does not remove the potential for humans to provide distinctive thought and analysis and students should be encouraged to make their own intellectual contribution in this new environment

Here are some practical recommendations for educators leading research methods modules:

- Build consideration of GenAI tools into the teaching. Add them to the portfolio of methods available and discuss their benefits and limitations
- Consider where GenAI can be used effectively to summarise large volumes of data
- Emphasise where human intervention and supervision is key to effective and accurate use of GenAI
- Address the ethical issues around using GenAI for research

Practical recommendations when supervising student research projects:

- Engage in continuing dialogue with students about whether and how they are using GenAI
- Foster critical discussion of material produced with the assistance of GenAI
- Encourage research projects which depend on students' intellectual contributions and cannot be carried out purely using GenAI

Ethical Declaration

No ethical approval is needed for this paper.

AI Declaration

No AI was used to write the paper.

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Enhancing Survey Participation in Academic Research: Strategies, Challenges, and a Framework for Optimal Response Rates

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Abstract: Survey-based research plays a critical role in academic inquiry, offering valuable insights into human behavior, perceptions, and experiences. However, declining response rates have emerged as a significant methodological concern, threatening the validity and generalizability of research findings. This paper explores what constitutes an optimal survey response rate in contemporary academic research and examines the key factors contributing to low participation. Drawing from existing literature and best practices, the paper evaluates current strategies used to improve response rates, including survey design, communication techniques, timing, and incentive models. Furthermore, it introduces a strategic framework aimed at enhancing participation while maintaining ethical standards. The discussion addresses the practical challenges of implementing these strategies across diverse research contexts and offers recommendations for both individual researchers and academic institutions. By synthesizing evidence-based approaches and proposing a flexible response optimization model, the paper contributes to the ongoing effort to improve the quality and reliability of academic survey research.

Keywords: Survey Response Rate, Academic Research, Participation Strategies, Survey Methodology, Response Optimization, Research Ethics

1. Introduction

A basic instrument in academic research, surveys are often used to collect huge amounts of data from particular populations in a systematic and affordable way. Surveys are essential for producing empirical evidence across disciplines, including education, psychology, business, health sciences, and the social sciences, whether they are used to gauge attitudes, track behaviors, assess programs, or test theoretical models. Though they are well-known, one of the most important methodological issues scholars today is falling survey response rates (Wright and Marsden, 2010).

Response rates to academic surveys, especially those sent out electronically, have been on a clear declining trend over the last two decades. Various elements contribute to this drop, including more digital noise, survey invitation oversaturation, privacy and data security issues, perceived irrelevance or lack of utility for possible participants, and the rising trend of survey fatigue. Often, as a consequence, researchers find participation rates below expectations, which compromises the quality, accuracy, and generalizability of their findings (Karlberg, 2015, Kumar, 2023, Taherdoost and Madanchian, 2025).

Thus, the idea of a "optimal" response rate is more than a statistical fantasy; it is a requirement for ethical and valid research. Although conventional standards say that a response rate over 60% is good and over 70% is perfect, especially in studies with online distribution or hard-to-reach populations, these numbers are becoming more challenging to accomplish (Teitler et al., 2003). Methodological soundness depends on the ability to define what is an ideal response rate today and how it might differ among research designs, fields, and target populations in this setting (Groves et al., 2011).

Low response rates have several consequences. First, they generate concerns over nonresponse bias, which happens when those who choose not to participate differ markedly from those who do, hence distorting findings and compromising representativeness. Second, they might lower statistical power, which would result in ambiguous or false results. At last, they raise moral questions, scholars have to consider the advantages of constant outreach initiatives and reward offers against possible coercion or invasion of participants' time and privacy (Singer, 1978).

Researchers have used several techniques to increase involvement in order to solve this several difficulties. These consist of improving survey tool clarity and duration, providing incentives, dispatching tailored reminders, guaranteeing anonymity, and using several different communication channels. The effectiveness of these

approaches, therefore, differs depending on contextual elements including the target audience, survey subject, mode of delivery, and institutional support (Martin and Sherington, 1997).

By evaluating what defines an ideal response rate in modern academic research, investigating the effects of low response rates, and offering feasible ideas to increase survey participation, this paper hopes to add to the continuing debate on survey methodology. The main goal is not only to provide a diagnostic perspective of the issue but also to present a strategic framework that researchers can modify and use depending on their own research objectives and resources (Figure 1).

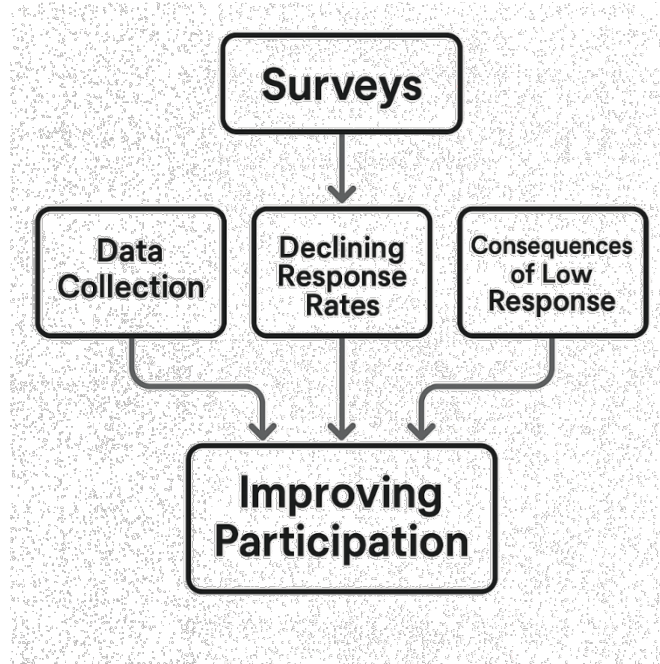


Figure 1. Challenges and Strategies in Academic Survey Research

2. Understanding Survey Response Rates

Survey response rates are a critical concern in empirical research, influencing the validity and generalizability of findings (Reyes, 2020, Taherdoost, 2023). Declining response rates in household and opinion surveys raise the possibility of distorted results (Reyes, 2020, Mölenberg et al., 2021). Therefore, understanding the factors that affect response rates and strategies to improve them is of great importance (Delnevo et al., 2004).

Research indicates that different methodologies are utilized to enhance survey participation. One approach involves prenotification. Sending advance letters or postcards prior to a call or survey has been shown to increase response rates. For example, McLean et. al. (McLean et al., 2014), found that sending a prenotification postcard before a questionnaire about bulimia nervosa mental health literacy increased response rates. However, the type of advance mailing also plays a role (Richardson, 2011).

The mode of data collection also significantly influences response rates. Derby et. al. (Derby et al., 2011), compared paper (in-clinic and postal) and electronic modes of survey administration, analyzing response rates and non-response bias. Ekholm et. al. (Ekholm et al., 2010), used data from face-to-face and telephone interviews. Research design, including the data collection medium, participant motivation (e.g. incentives), and researcher motivation all effect response rate fluctuations (Holtom et al., 2022).

Furthermore, tailoring the survey approach to specific populations can impact response rates. González-Cabán et. al. (González-Cabán et al., 2007), compared survey response rates, protest refusals to pay, and willingness-to-pay of Native American communities compared to Montana's general population for wildland fire mitigation strategies using a contingent valuation method (CVM) study. They found that Native Americans survey response rates were not significantly different from Montana residents for the initial contact but were significantly different for the follow-up in-depth phone interviews. Similarly, Ramírez et. al. (Ramírez et al., 2017), described the challenges in

recruiting Spanish-speaking respondents for a national health communication survey and strategies used to improve rates and quality of responses.

Incentives also appear to play a role (Delnevo et al., 2004). Delnevo et. al. (Delnevo et al., 2004), summarized primary care physician responses to a mail survey on smoking cessation by physician specialty and timing of incentive, underlining the importance of understanding research strategies that facilitate adequate response rates.

Temporal factors can also influence survey response rates. Madariaga et. al. (Madariaga et al., 2017), investigated the influence of email scheduling on the response rate and response time for an online survey of school principals in Chile. Rookey et. al. (Rookey et al., 2012), analyzed mail-back surveys of visitors to US National Parks from 1988 to 2007, examining the roles of additional contacts and survey salience in maintaining high response rates.

However, some strategies may not be correlated with response rates. Geyer et. al. (Geyer et al., 2020), found that the use of reminders and validated questionnaires were not correlated with response rates.

The problem of non-response is experienced worldwide (Jacoby et al., 2022). Quesada et. al. (Quesada et al., 2008), reported findings of an exploratory survey administered in the USA, Spain and Costa Rica on leaders' behavior, achieving different response rates in each country. Nakashima et. al. (Nakashima et al., 2024), analyzed response rates and respondent demographics in online surveys assessing public perception of Alzheimer's disease-modifying therapies in Japan, achieving a 16.9% response rate in two weeks.

Ellis et. al. (Ellis et al., 2022), performed a systematic review to examine the predictors of response rates, exploring reasons provided for low response rates and identifying strategies to improve those rates. They thematically analyzed reasons for low response and used those reasons to identify strategies to improve response rates.

Holtom et. al. (Holtom et al., 2022), examined survey response rates, indicating an increase in average response rate from 48% in 2005 to 68% in 2020. Understanding the factors that affect survey response rates remains crucial for ensuring the validity and reliability of research findings.

3. Consequences of Low Response Rates

The phenomenon of low response rates in survey research has garnered significant attention in various fields, particularly in criminology and social sciences (Figure 2). The implications of low response rates are multifaceted, affecting the validity and reliability of research findings. This literature review synthesizes key insights from relevant studies, highlighting the consequences of low response rates and the associated biases that may arise.

One of the primary concerns regarding low response rates is the potential for nonresponse bias. Pickett et. al. (Pickett et al., 2018), emphasize that a long-term downward trend in response rates has led to confusion about the relationship between nonresponse bias and response rates. The authors argue that the disciplinary assumption that surveys with low response rates yield biased estimates is prevalent, which can lead researchers to apply simplistic rules for assessing the quality of survey data. This assumption is critical, as it suggests that low response rates may systematically skew results, thereby undermining the integrity of research conclusions.

In the context of behavioral research, the effects of low response rates can be observed in the dynamics of responding behavior. Spealman (Spealman, 1976), discusses how low rates of responding can influence the local rate of key pecking in operant conditioning paradigms. The study indicates that when responding is maintained at low levels, it can affect the overall behavioral patterns observed in experimental settings. This finding suggests that low response rates may not only impact the data collected but also the interpretation of behavioral responses, leading to potentially misleading conclusions.

Cole (Cole, 2001), further explores the long-term effects of high- and low-rate responding histories on fixed-interval responding in rats. The study reveals that animals with a history of low-rate responding exhibit different behavioral patterns compared to those with high-rate responding histories. This variation underscores the importance of considering response rates in behavioral studies, as they can significantly influence the outcomes and interpretations of research findings.

The implications of low response rates extend beyond behavioral studies to ecological and demographic research. For instance, Owen-Smith (Owen-Smith, 2006), examines the shape of density dependence in African ungulate populations, noting that the relationship between population growth rates and density can be affected by the quality

of data collected. If low response rates lead to incomplete or biased data, the resulting models may misrepresent population dynamics, ultimately affecting conservation efforts and management strategies.

Moreover, the concept of plasticity in response to environmental conditions, as discussed by Rice et. al. (Rice and Bazzaz, 1989), highlights another dimension of low response rates. The study quantifies the growth advantages of plant traits in response to varying resource levels, suggesting that low response rates in ecological surveys may obscure the true adaptive strategies of species. This can have significant consequences for understanding ecological interactions and the resilience of ecosystems under changing conditions.

In the realm of medical and biological research, the consequences of low response rates are equally pronounced. For example, Maks et. al. (Maks et al., 2011), investigate the effects of radiation exposure on white blood cell counts, emphasizing the importance of accurate data collection in understanding dose-response relationships. Low response rates in clinical studies can lead to incomplete data sets, which may hinder the ability to draw reliable conclusions about health outcomes and treatment efficacy.

In summary, the consequences of low response rates are profound and multifaceted, impacting various fields of research. The potential for nonresponse bias, the influence on behavioral dynamics, and the implications for ecological and medical studies all underscore the critical need for researchers to address low response rates proactively. As highlighted by Pickett et. al. (Pickett et al., 2018), understanding the relationship between response rates and data quality is essential for ensuring the validity of research findings. Future research should continue to explore strategies for improving response rates and mitigating the biases associated with low participation, thereby enhancing the robustness of empirical studies across disciplines.

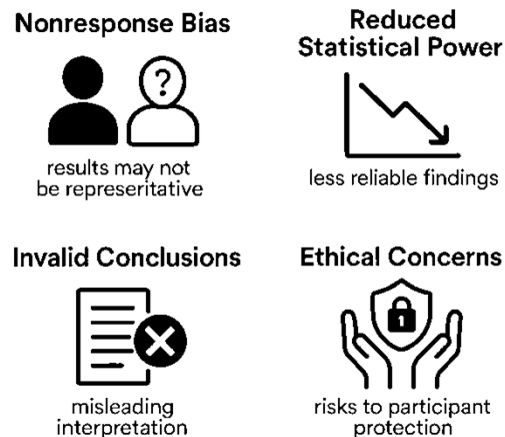


Figure 2. Consequence of Low Response Rate

3.1 Review of Existing Strategies to Improve Response Rates

Response rates are a critical consideration in various research endeavors, impacting the validity and generalizability (Phillips et al., 2016). One significant area where response rates are vital is in survey research. VanGeest et. al. (VanGeest et al., 2007), conducted a systematic review, concluding that researchers should persistently implement design strategies documented to improve survey response, particularly among physicians. Phillips et. al. (Phillips et al., 2016), emphasize that improved response rates can enhance survey validity by reducing unit and item nonresponse. Specifically for health professions trainees, Phillips et. al. (Phillips et al., 2017), found a statistically significant association between survey type (single- vs. multi-institutional) and response rate. Single-institutional surveys exhibited higher response rates compared to multi-institutional ones. When considering web surveys, Sammut et. al. (Sammut et al., 2021), aimed to evaluate strategies to increase response rates, noting the strides made in questionnaire survey methodology due to the rise of the web. McPeake et. al. (McPeake et al., 2014), also address electronic surveys, discussing simple techniques to enhance response rates. Cook et. al. (Cook et al., 2016),

focused on Internet-based physician surveys, evaluating the impact of low-cost nonmonetary incentives and paper mail reminders.

4. Proposing a Strategic Framework to Enhance Survey Participation

Survey participation is a critical component of research across various fields, including social sciences, public health, and market research. The effectiveness of surveys often hinges on the level of participation, which can be influenced by numerous factors, including the social and physical environment, the design of the survey, and the incentives provided to participants. This literature review synthesizes existing frameworks and findings from various studies to propose a strategic framework aimed at enhancing survey participation.

Perkins et. al. (Perkins et al., 1990), explored the relationship between community participation and various block-level variables, including demographics and the built environment. Their findings suggest that the social context significantly influences participation rates in community surveys. This indicates that understanding the local environment and community dynamics is essential for designing effective surveys that encourage participation. The study highlights the importance of tailoring survey approaches to fit the unique characteristics of the target population, which can be a foundational element in a strategic framework for enhancing survey participation.

In the realm of public participation in scientific research, Shirk et. al. (Shirk et al., 2012), proposed a framework that emphasizes the quality and degree of public involvement in research processes. Their findings suggest that well-designed participatory frameworks can significantly influence project outcomes. This aligns with the notion that enhancing survey participation requires not only reaching out to potential respondents but also ensuring that the process is engaging and meaningful. Incorporating elements of participatory design can thus be a vital strategy in the proposed framework.

The concept of incentives is further explored by Buragohain et. al. (Buragohain et al., 2003), who apply game theory to peer-to-peer systems. They propose a differential service-based incentive scheme to improve participation in decentralized networks. This approach can be adapted to survey participation by identifying and implementing incentives that motivate individuals to engage with surveys. By understanding the strategic interactions among potential respondents, researchers can design surveys that offer compelling reasons for participation, thus enhancing overall response rates.

Moreover, the work of Kacem et. al. (Kacem et al., 2016), on improving e-government services through social media insights underscores the importance of understanding user profiles to tailor services effectively. This approach can be mirrored in survey design, where understanding the demographics and preferences of potential respondents can lead to more targeted and effective survey strategies. By leveraging social media data, researchers can gain insights into the motivations and barriers faced by potential participants, allowing for the development of more appealing survey invitations and formats.

The multi-stakeholder involvement management framework proposed by Waligo et. al. (Waligo et al., 2013), also provides valuable insights into enhancing participation. Their findings indicate that effective stakeholder engagement is crucial for successful outcomes in sustainable tourism initiatives. This principle can be applied to survey participation by recognizing the diverse stakeholders involved and ensuring that their perspectives and needs are considered in the survey design process. By fostering a sense of ownership and relevance among potential respondents, researchers can enhance participation rates.

Finally, the recent work by Zhou et. al. (Zhou and Kaplanidou, 2023), on social capital and event participation highlights the importance of sustained engagement beyond the immediate context of the survey. Their findings suggest that temporary interactions may not be sufficient to build lasting social capital. This insight can inform strategies that encourage ongoing engagement with survey participants, potentially through follow-up surveys or community-building initiatives that keep respondents connected to the research topic.

5. Discussion

Increasing survey response rates is still a constant difficulty in academic research. Although many techniques have been tried and used in various fields, their effectiveness is usually situation-dependent. The suggested methodology in this research addresses this continuous problem by means of a multi-pronged strategy combining digital optimization, ethical incentive use, strategic timing, and personalization. Real-world efficacy of these plans, however, is affected by several pragmatic, technical, and ethical issues.

Understanding the target audience mostly determines the efficacy of tactics like personalized invites, reminder scheduling, and incentive programs. For example, while senior professionals would prefer short, purpose-driven invitations with guarantees of secrecy and relevance, student populations might respond well to digital reminders and minor incentives. Higher completion rates are also aided by the use of visually intuitive designs and mobile-optimized survey platforms. Including the survey into people's daily lives, for example, by distributing during class transitions or work breaks, has been shown to boost involvement.

Though they could be advantageous, using these techniques raises significant difficulties. Resource availability is one major barrier; not all academics have the tools, platforms, or funding required to implement advanced engagement techniques. Particularly in research with vulnerable populations, institutional review board (IRB) restrictions could also affect the kinds of incentives that can be presented or the way reminders are sent. Moreover, too much reliance on reminders could cause participant weariness, hence reducing the impact of follow-up messages. Technological constraints include inadequate email deliverability or lack of mobile connection in some areas make it even more difficult to reach high response rates.

Researchers have to use a data-driven and participant-centered strategy if they want to improve response rates sustainably. This calls for running pilot tests to evaluate the efficacy of various tactics prior to complete implementation. Universities and research institutions should provide training courses that arm academics with knowledge in digital survey design, audience segmentation, and ethical incentive use. Developing centralized systems with consistent survey dissemination methods can simplify work and reduce departmental participant outreach duplication. Furthermore, by means of awareness campaigns, promoting a culture of research engagement might slowly raise desire to participate, especially in academic environments where surveys are common.

6. Conclusion

Survey response rates are a critical yet often underestimated component of academic research quality. As this paper has demonstrated, a low response rate can undermine a study's validity, introduce bias, and compromise its credibility. While there is no universally accepted benchmark for what constitutes an "optimal" response rate, maintaining a high level of participation is essential for ensuring that findings are representative and reliable.

Through an exploration of existing literature and strategies, this study highlighted a range of techniques that researchers can employ to enhance participation, from optimizing survey design and timing to leveraging ethical incentives and personalized outreach. The proposed strategic framework offers a structured approach to improving response rates by aligning these methods with the specific context and characteristics of the target population.

Nonetheless, practical challenges such as resource constraints, technological limitations, and ethical considerations must be carefully navigated. Institutional support, including training in digital research tools and standardized distribution protocols, can play a pivotal role in helping researchers address these barriers.

In conclusion, improving survey response rates requires a deliberate, participant-centered, and context-aware approach. By adopting flexible and ethical engagement strategies, researchers can significantly increase participation, thereby strengthening the overall impact and trustworthiness of academic research. Future studies should focus on testing the proposed framework across diverse disciplines and demographic groups, and on exploring innovative tools, such as AI and chatbot technologies, to further support effective survey engagement.

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Research in Education: Case Cybersecurity Project

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Abstract: This action research investigates the integration of research into education through the Cybersecurity Project Course at Laurea University of Applied Sciences. The research period spans from spring 2022 to autumn 2024, during which the course produced research and development material for the DYNAMO project. The course, designed for bachelor-level students consists of 5 credits, and is aimed at preparing students with essential research skills in safety, security, risk management, and business information technology (cybersecurity). The study focuses on students' development in applying cybersecurity competence, project management, risk assessment, risk control, and communication skills. The research is focused on providing insights that can be used to optimise future educational programs in cybersecurity and risk management. The course utilises a structured module-based methodology to assess the efficiency of the study unit and its potential to influence the design of future security and risk management training programs. The learning platform, CANVAS, enhances students' learning experiences using various tools. This study focuses on evaluating the knowledge and contributions from the DYNAMO project. Collaboration between cybersecurity students and research, development, and innovation partners is enhanced through action research principles and empirical observation. The tasks in the course's six modules and orientation module help students develop their technical and soft skills. The findings show that students had a positive experience using platforms like Microsoft Teams for project management. Despite some finding the course more theoretical than expected, they valued the focus on writing scientific articles and understanding governance models. The course improved students' project management, risk assessment, and ethical considerations in cybersecurity, and led to the creation of several research papers for the DYNAMO project, offering valuable insights into cybersecurity governance, awareness, and threat intelligence. The study concludes that integrating research into cybersecurity education fosters a research culture, enhances flexibility, and prepares students for future projects. Collaboration with companies is crucial for addressing cybersecurity challenges. The course's structured approach and multi-sensory learning techniques provide an enjoyable experience, equipping students with valuable professional skills. These findings highlight the importance of including real-life research projects in the curriculum to improve students' learning and professional competence in cybersecurity.

Keywords: Cybersecurity Education, Research Integration, Project Management, Structured Learning, Peer Review

1. Introduction

The European Union/European Commission has created funding instruments for research in the European Research Area (ERA) through the EU Research and Innovation (R&I) programmes (European Commission Directorate General for Research and Innovation, 2022). Many organisations are increasingly relying on international R&I projects for their R&I investments. It is important for technology developers from all organisations, including industrial companies, small and medium-sized enterprises, research organisations, universities, government agencies, and others, to comprehend the functioning of the European innovation system (Rajamäki & Pirinen, 2022).

Teaching methods and content delivery have been shifted due to the rapid technological development and widespread digital transformation in higher education institutions (HEI). The use of digital technology in higher education has resulted in numerous benefits, such as better accessibility, collaboration, and efficiency. Cybersecurity challenges are part of the challenges with digitalisation in higher education. (Siphambili, 2024)

The project is implemented in teams using a defined process for research and development work. Students' skills in information security planning, development, and management in a target organisation/consortium are developed by implementing an information security project. Research work is carried out by the teams in Laurea's research, development, and innovation project DYNAMO. The project ends up with deliverables, including a technical solution that is demonstrable, a final project report, or a research paper that accurately demonstrates the results. Video presentations are used by the team or individual researcher to report on their progress.

The study's research questions are:

- What knowledge has the DYNAMO project contributed to the students?
- What have the students produced for the DYNAMO?

The introduction is followed by a literature review in Chapter 2, and the research methodology is presented in Chapter 3. Chapter 4 introduces the description of the study unit. The research findings are presented in Chapter 5, and Chapter 6 concludes with a discussion of future research requirements.

2. Literature

The purpose of cybersecurity is to safeguard computer systems and Internet networks from information disclosure, theft, or damage (Cambridge Learner's Dictionary, 2025; Sareen & Jasaiwal, 2021). Cybersecurity involves defending hardware, software, and electronic data from disruption or misdirection in their services.

In today's job market, it is important to possess soft skills (Coghlan & Brannick, 2015; Ruoslahti et al., 2021) such as teamwork, communication, professionalism, and ethics (Rajamäki et al., 2024). Collaboration with companies offers students the benefits of research activities, including developing structured problem-solving skills, acquiring in-depth knowledge, improving teamwork, and improving communication skills (Schefer-Wenzl & Miladinovic, 2022). Incorporating research into the curriculum fosters a culture of research, increases research flexibility, and allows for the recognition and reward of good student performance (Schefer-Wenzl & Miladinovic, 2022). Research projects have made students more prepared for future research projects. Supervisors were more cautious, even though they acknowledged the advantages. However, the research experience was satisfactory for both students and supervisors according to research. (Rajamäki et al., 2024)

The Learning by Developing (LbD) pedagogical model is a fundamental principle that provides a foundation for linking Research, Development and Innovation (R&D&I) projects to cybersecurity education (Raij, 2007). The LbD model emphasises the significance of genuine learning experiences, active involvement in research, creativity, and establishing strong partnerships (Pirinen, 2009; Rajamäki & Pirinen, 2022). The LbD model enhances students' learning experience and prepares them for the realities of cybersecurity by actively involving them in international Research and Development (R&D) projects during their studies (Rajamäki et al., 2024).

Learning is linked to applied R&D projects and a development culture when higher education, externally funded research and development are integrated (Rajamäki, 2018). (Ruoslahti et al., 2018, p. 11) identified three roles when integrating learning into R&D: "1) the responsible teacher, who integrates learning development objectives with research and development activities, 2) the teacher preparing lecture materials, who integrates teaching with research and development activities, and 3) the student, who integrates learning with research and development activities".

Collaboration with companies is essential for cybersecurity universities. This method provides students with knowledge about the current state of the industry. Both teachers and practitioners believe that close collaboration with companies allows for a practical perspective (Bulai et al., 2019). Cybersecurity education poses several challenges. The level of knowledge among teachers, a lack of expertise, funding, and resources are among the issues (Rahman et al., 2020).

3. Method

This study utilised the principles of action research and empirical observation to enhance an applied research methodology. Action research aims to improve specific practices or situations using planning, action, observation, and reflection in an iterative process (Bouki, 2007; Coghlan & Brannick, 2015; Zydney et al., 2002). The study aims to enhance the collaboration between research, development, and innovation (RDI) and work-life partners of cybersecurity students. Figure 1 outlines the practical steps to implement a cybersecurity program module, showing a simplified model depicting the typical action research cycle, where planning, acting, observing, and reflecting are the four steps of each cycle.



Figure 1: Process steps of the study. Adapted from (Susman & Evered, 1978).

The goal of action research is to improve a specific practice or situation through a series of planning, action, observation, and reflection (Coghlan & Brannick, 2015). In this instance, the researchers aim to enhance cybersecurity students' learning experiences and professional competence by employing appropriate R&D&I projects in the degree curriculum. The main objective of action research in real-life situations is to solve real-life problems. Action research is often selected when there is a need for human participation (O'Brien, 2001). Through change and reflection during an ongoing problem, action research combines theory and practice (and researchers and practitioners) under a mutually acceptable ethical framework. The action research process involves researchers and practitioners working together in a specific action cycle, which includes problem diagnosis, action intervention, and reflective learning. (Avison et al., 1999)

4. Research Material

Since 2022, two cybersecurity project courses have been organised twice a year. Implementing cybersecurity project courses in spring 2022, autumn 2022, spring 2023, autumn 2024, and ongoing course in spring 2025 have been commissioned for the DYNAMO project. The materials from previous courses, including students' reports, are accessible and can be used for students' work. The background materials given to students comprised conference papers, DYNAMO public documents, other cybersecurity-related sources and material from previous courses.

5. Study Units' Description

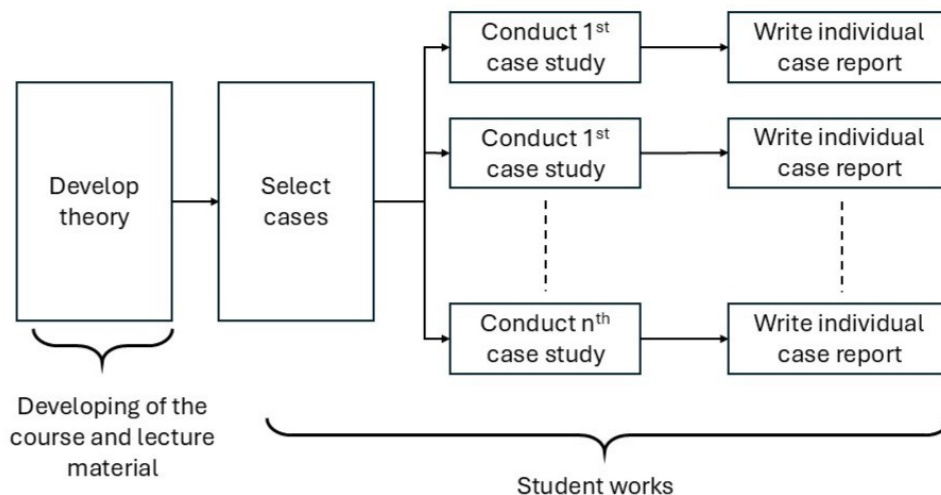


Figure 2: A learning-based approach. Modified from (Modified from Yin, 2009).

The openness principle (Open Science, Open Access, and Open Data) is used: Most assignments (Word documents, PowerPoint presentations, and videos) prepared and presented during this study unit will be open for all participants and future study units. Certain materials may be confidential and for internal use by DYNAMO

Project partners. A student must sign a light non-disclosure agreement (NDA) before releasing such material to them.

5.1 Targets of the Study Unit

In this study unit, students and teachers work as part of an international research consortium that produces new knowledge and other research results using methodological continua, such as understanding, innovating, demonstrating, building, testing, improving, fictionalising, transforming, experiencing, evaluating, implementing, and disseminating. The overall goal of the study module is to understand the European innovation system and how to operate as part of it. Another goal is to apply case studies, design science or service innovations and design tools, and be aware of the latest know-how and cybersecurity knowledge.

Learning objectives of the course are:

- Recognise research gaps and research focus
- Apply chosen information security framework in the project work
- Identify the most significant information security risks in the target organisation
- Find needed controls for identified information security risks
- Present the results of the project both in writing and orally
- Work in the project
- Compose a project plan
- Compose a WBS (work breakdown structure)
- Plan resource allocation
- Compose project updates and report frequently
- Present project results to other groups
- Use project management tool
- Make both self and peer-to-peer evaluation
- Work independently and within a team to reach the required solution

The study unit targets students who can recognise the research gap and research focus by applying the chosen information security framework in the project work. Students should also identify the most significant information security risks in the target organisation and find needed controls for identified information security risks. Students should be capable of presenting the project's results in writing and orally and know how to work on the project. Working on a project consists of composing a project plan and a WBS (work breakdown structure), planning resource allocation, composing project updates, and reporting frequently. Presenting project results to other groups, making self and peer-to-peer evaluations, independently working, and working within the team are learning objectives.

The course is designed for students to identify research gaps and focus on having the ability to apply the selected information security framework in project work. The course is designed to teach students how to present project results in writing and orally, create a project plan, work on projects, and conduct both self- and peer-review. Teachers provided guidance when necessary. Multi-sensory learning and diverse learning materials, such as videos, were utilised in the course. The course was structured into six modules and an orientation module. To receive credit, students are required to complete assignments and reflections in the course.

The working method is to conduct research/development work in teams. A clearly defined process facilitates the project's implementation. Implementing an information security project enhances students' abilities in planning, developing, and managing information security in a targeted organisation/consortium. Research work is carried out by teams in conjunction with Laurea's research, development, and innovation project in this course for the DYNAMO project (DYNAMO project, 2024). Academic work is combined with real industry needs and innovation projects during the course. Integrating an international research project into the curriculum is a method to promote research culture in higher education. In a lively learning environment, students acquire valuable experience and, aside from technical skills, gain significant soft skills such as communication, teamwork, and respect for diversity. (Rajamäki et al., 2024) In this project-based learning, students participated in the development of an international project.

5.2 Course Modules and Assignments

The project results in deliverables, e.g. a demonstrable technical solution, a final project report or a research paper that demonstrates the results appropriately. The teams report and present their progress through video presentations.

The modules are based on the themes, and studies are divided into six modules and an orientation module, as described in the following table.

Table 1: Course modules and schedule.

Module #	The Subject of the Module	Period
Orientation	Basic information about the course	
1	Introduction to the topic and forming of research teams	Weeks 34-36
2	Determination of the RDI problem	Weeks 37-39
3	Project idea focusing and project plan	Weeks 39-42
4	Project work	Weeks 42-45
5	Reporting and sharing results	Weeks 46-50
6	Project finalising	Weeks 51-52

The orientation module had basic information on how to proceed with the study unit, including evaluation criteria and background material on cybersecurity. Module 1 consisted of an online Zoom meeting introducing the study unit and the key concepts of the DYNAMO project. Research teams were formed during Module 1. Module 1 had two assignments: familiarising DYNAMO key concepts and team formations. In Module 2, students planned preliminary research ideas and iterated research ideas according to peer review suggestions. In Module 3, teams made project plans and peer-reviewed other teams' plans. Mid-presentations were introduced, and peer reviews were given in Module 4. The module contained final presentation videos and peer reviews for them. Students wrote draft extended abstracts for the conference and peer-reviewed other teams' draft abstracts in Module 5. The final extended abstract was written and peer-reviewed, and self-assessment was given during the Module. A Work-in-progress (WIP) paper as a final report was written during the module. Project finalising consisted of self-evaluation of project management and teamwork.

The course is divided into 18 assignments. Student earns 3-40 credits from the assignments, depending on the scope of the assignment (Table 2).

Table 2: Assignments and points.

Assignment Name	Points	Assignment Name	Points
1: Familiarising with DYNAMO key concepts	3	2: Formation of teams	0
3: Preliminary research idea	3	4: Research idea peer review	3
5: Iterated research idea	3	6: Opponent team's peer review	3
7: Project plan	20	8: Project plan peer review	3
9: Mid presentation	5	10: Mid-presentation peer review	3
11: Final presentation videos	5	12: Peer review of the final presentation	3
13: Draft extended abstract	15	14: Peer review of draft extended abstract	3
15: Final extended abstract + self-assessment according to the ICCWS/ECCWS criteria	15	16: Final report (WIP) paper	40
17: Self-evaluation of project management and teamwork	5	18: Extra peer reviews of final abstracts	3

Evaluation is based on point gain during the study unit: 80 points are required to complete the course, with the maximum score being 134 points. The course used the digital workspace CANVAS and included lecture materials, recorded videos, presentations, and additional learning materials. Modules were the basis for the course's

structured learning objectives. The course consisted of an orientation period and 6 modules, taking 12 weeks to complete. The instructors could be contacted through a discussion forum. The course employed multi-sensory learning techniques along with a variety of learning materials, such as videos and reading materials. Assignments had to be returned within two (2) to five (5) weeks for each of the six modules in the course.

A broad range of technical skills and strong soft skills, such as communication, critical thinking, and problem-solving, are necessary for cybersecurity professionals. R&D&I projects are being incorporated into cybersecurity curricula by higher education institutes to meet this changing need. Several studies confirm that this strategic approach leads to a win-win situation for students, higher education institutes, and the industry. (Rajamäki et al., 2024)

6. Results

This chapter first discusses the students' viewpoint on the study period. Then, it analyses the added value the course has provided to the DYNAMO project.

6.1 Students' Perspective

The teamwork experience in the course was generally positive for students. Microsoft Teams and other platforms were commonly used by groups for projects and planning materials. Their success was largely attributed to their regular meetings and open communication. The teams were successful in meeting deadlines and producing high-quality work despite some scheduling challenges and occasional absences. According to one student, "Everyone contributed to the project consistently, and I have no negative feedback for any team member."

The course was perceived to be more theoretical than some students anticipated. The emphasis on writing scientific articles and understanding governance models was appreciated by some, but others were looking forward to more hands-on, practical cybersecurity work. According to one student, "The course was more about writing theories in the context of cybersecurity. It's not always a negative thing, but it's not what I thought it would be".

Even though they faced obstacles, students believed that they had acquired valuable skills and knowledge. Project management, risk assessment, and the importance of ethical considerations in cybersecurity were topics they learned about. They were able to enhance their teamwork and communication skills through the course. According to a student's reflection, 'This project taught me a great deal about the importance of balancing technical solutions with ethical considerations, especially in sensitive areas like cybersecurity.'

Teams had different approaches to project management. A week-by-week plan was followed by some teams, while others prioritised the overall project from the start. Teams were able to meet deadlines and produce quality work despite their different approaches. Project management was perceived as very loose by one student. One team conducted a week-by-week assessment and then assessed what was required for the next deadline.

7. Benefits for the DYNAMO Project

The courses have led to the creation of research for the DYNAMO project. The conference papers for the DYNAMO project, which came from the Cybersecurity Project course, are presented in Table 3 below.

Table 3: Articles produced for DYNAMO.

Title	Author(s)	Publication
Governance and management information system for cybersecurity centres and competence hubs	Jyri Rajamäki, Janne Lahdenperä	22nd European Conference on Cyber Warfare and Security
Improving the Cybersecurity Awareness of Finnish Podiatry SMEs	Rajamäki et al.	WSEAS Transactions on Computers
Implications of GDPR and NIS2 for Cyber Threat Intelligence (CTI) Exchange in Hospitals	Rajamäki et al.	WSEAS Transactions on Computers

Title	Author(s)	Publication
E-EWS-Based Governance Framework for Sharing Cyber Threat Intelligence in the Nepal Energy Sector	Jyri Rajamäki, Asfaw Feyesa and Anup	European Conference on Cyber Warfare and Security (2024)
DYNAMO and the EU AI Act: Balancing Innovation and Regulation	Tikanmäki et al.	International Conference on Cyber Warfare and Security (2025) In press
Navigating the Cyber Resilience Act: Implications for the Dynamo Horizon Project	Rajamäki et al.	European Conference on Cyber Warfare and Security (2025) In press
AI Governance: Achieving EU AI Act Compliance in the Dynamo Project	Tikanmäki et al.	European Conference on Cyber Warfare and Security (2025) In press
MISP Management Models for Effective Threat Intelligence in Cybersecurity	Tikanmäki et al.	European Conference on Cyber Warfare and Security (2025) In review
Cyber Threats in Hospitals: GDPR and NIS2 Regulations in Preventing USB Injections	Tikanmäki et al.	International Conference on Cyber Warfare and Security (2025) In press
A CTI Governance Framework for Enhanced Resilience in Critical Infrastructure Sector	A Nepal et al.	European Conference on Knowledge Management (2025) In review
AI Governance: Achieving EU AI Act Compliance in the Dynamo Project	Burns et al.	European Conference on Cyber Warfare and Security (2025) In press
Enhancing Risk Management on IoT Medical Devices	Tikanmäki et al.	European Conference on Cyber Warfare and Security (2025) In review
AI and Cyber Threat Intelligence Management in the Energy Sector	Rajamäki et al.	European Conference on Knowledge Management (2025) In review

The table presents an in-depth analysis of recent and upcoming cybersecurity research, emphasising topics such as GDPR, NIS2 regulations, AI governance, cyber threat intelligence, and risk management in various sectors, such as healthcare and energy. The authors are teachers and students, who have written for multiple conferences and journals.

Table 4 below contains conference papers written for the DYNAMO project based on or as part of the thesis.

Table 4: Thesis or part of thesis-based articles.

Title	Author(s)	Publication
Implementation of OSINT for Improving an International Finance Sector Organization's Cybersecurity	Tiitta & Rajamäki	Proceedings of the 19th International Conference on Cyber Warfare and Security (ICCWS)
Utilisation and Sharing of Cyber Threat Intelligence Produced by Open-Source Intelligence	McMenamin & Rajamäki	Proceedings of the 19th International Conference on Cyber Warfare and Security (ICCWS)
Governance for Cyber Threat Intelligence (CTI) Exchange Across the DYNAMO Resilience Cycle	Nepal & Rajamäki	European Conference on Cyber Warfare and Security (2025) In review
Enhancing Cyber Threat Intelligence (CTI) Exchange: A Governance Model for the DYNAMO Platform	Rajamäki, Nepal and Chalkias	European Conference on Cyber Warfare and Security (2025) In review

As Table 4 indicates, four conference papers were written either based on the thesis or as part of them. Conference papers that contribute to the DYNAMO project and thesis are highlighted in this table. The focus is on implementing and governance cyber threat intelligence (CTI). These papers address different aspects of CTI, such as the utilisation of open-source intelligence (OSINT) and governance models for efficient CTI exchange. The research is designed to enhance cybersecurity in various sectors using the DYNAMO platform.

8. Discussion

Students and teachers need cybersecurity awareness to identify cybercrimes and cyber threats. In preventing cybersecurity threats, it is crucial to have education or training. To be safe, it is important to be aware of the

potential risks. Education, teacher knowledge level, and expertise are among the challenges that cybersecurity poses. People's mindsets can be changed through cybersecurity education. A lack of knowledge about cybersecurity's importance and implications is the cause of a person's lack of cybersecurity awareness. Increasing safety and security can be achieved through the incorporation of cybersecurity into education in educational institutions and by raising awareness.

The students deemed the course a bit distant and hoped for more face-to-face classes where they could converse with teachers and other students about course-related matters. The students suggested improving the study unit by providing more feedback on their assignments. Students sought more detailed information about the purpose and functioning of academic conferences. One student had expected the course to be more practical in terms of cybersecurity, not theoretical. The course's unclear structure and tasks caused frustration among one group. Clear instructions on which issues should be considered were required for the self-assessment task. Several students claimed that full-time work sometimes hindered their ability to concentrate on their studies. The course was considered interesting and useful for learning how to write scientific articles and learning about the DYNAMO project. It was desired to have a complete view of the entire course so that students could start with a clear understanding of what is being done and why. Due to the course schedule being too tight, the schedules often did not work, and it was anticipated to change.

"While this assignment seemed confusing in terms of the actual practical application of cybersecurity to the project framework, I was surprised to see it as a thorough exposure experiment for writing real-life research papers".

The course examined a structured module-based approach to evaluate the effectiveness of the study unit and what insights it can provide for the design of future security and risk management training programs. The course content was well-received by students, with topics like cyberattacks, business continuity management (BCM), and threat intelligence. Valuable insights were gained from the DYNAMO project and other materials. According to one student, learning the connection between cyberattacks, BCM, Echo-Early Warning System (E-EWS), and threat intelligence has been extremely beneficial.

The overall impression was that the course was both demanding and rewarding. The chance to work on real-life research projects allowed students to feel proud of their achievements. Their positive experience was attributed to the collaborative environment and the support from teammates, which were highlighted as key factors. One student summarised, "Overall, this course was a great opportunity to improve technical and teamwork skills. I am proud of how our team worked together and the quality of the project we delivered."

8.1 Teamwork

The work in the group was evenly distributed, and all members contributed: "We support each other in our work and provide feedback. We similarly work on tasks and can rely on each other's judgement when it comes to editing, etc". Some teams had previous experience working together, and thus, they felt it was easy to divide the responsibilities. One team selected a project manager from among them, whose task was, among other things, to book common working times and assign tasks for each team member. The team's working methodology was to work independently before meeting once a week to bring together various areas.

The importance of teamwork and collaboration was consistently emphasised by students. Microsoft Teams and WhatsApp were used by many groups to communicate and manage projects. The key to their success was having regular meetings and open communication. A student mentioned that we all worked in unison to bring the project to a productive conclusion, and we gained a lot from each other.

8.2 Challenges and Limitations of the Study

A complete view of the entire course was sought to provide a complete understanding of what happens and why from the start. The schedules did not always work because the course schedule was considered too tight, and it was hoped to change. The technical limitations made it difficult to co-edit the documents. A few students mentioned areas in which the course could be improved. They proposed more contact lessons to facilitate conversations with peers and instructors. Common requests were for teachers to provide clearer instructions and more detailed feedback. Some students admitted they were uncertain about what the assignments demanded of them. Some of the instructions were not easy to follow or seemed incomplete.

9. Conclusion

The findings indicate that students had a positive experience with a course integrated into an international R&D project. Students appreciated using similar platforms like Microsoft Teams in studies as companies use in the workplace. Although the course was more theoretical than expected, students valued the emphasis on writing scientific articles and understanding governance models. The course improved students' skills in project management, risk assessment, and ethical considerations in cybersecurity. Additionally, the course resulted in the creation of several research papers for the DYNAMO project, providing valuable insights into cybersecurity governance, awareness, and threat intelligence.

The study highlights that integrating research into cybersecurity education fosters a research culture, enhances flexibility, and prepares students for future projects. Collaboration with companies is crucial for addressing cybersecurity challenges. The course's structured approach and multi-sensory learning techniques make it an enjoyable learning experience, equipping students with valuable professional skills.

As a follow-up study, the career development and professional success of students who have completed the course should be tracked over the long term. It could be investigated whether exposure to international research and development activities during their studies has influenced their career paths.

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Ethics Declaration

Ethical clearance was not required for the research.

AI Declaration

The paper's spelling was verified using the artificial intelligence tool.

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Mystery Shopper Training in Tourism and Hospitality Education: An Interdisciplinary Approach

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Abstract: This paper puts forward two pedagogical initiatives involving practical research projects grounded in the Mystery Shopper methodology. Designed to align with the evolving demands of hospitality and tourism management, these initiatives aimed to bridge theoretical learning with hands-on application, enabling students to develop essential managerial, observational, and evaluative competencies. By engaging as mystery guests in real-world restaurant settings and tourist attractions, students assumed the role of consultants, identifying service inconsistencies and proposing evidence-based improvements within the scope of different courses. These initiatives emerged from a faculty-led project aimed at promoting pedagogical innovation and applied research, by fostering student engagement through relevant, experiential learning. They sought to fulfil several pedagogical goals, including understanding the significance of the Mystery Guest approach, identifying criteria for service quality, and reinforcing theoretical knowledge from different subjects. Additionally, they emphasized collaborative learning, communication skill development, and interaction with industry stakeholders. In addition to framing the methodology and providing examples within the scope of hospitality and tourism, authors outline the two initiatives – one focusing on restaurants and another on artists ateliers included in tourist itineraries – describing their implementation and reflecting on their affordances. Combining service training with observational research, both initiatives were successful in involving students as both participant observers and active research agents in the design and implementation of evaluation tools, having highlighted the value of integrating applied research into tourism education, promoting critical thinking, reflective practice, and stronger alignment with market needs.

Keywords: Checklists, Interdisciplinarity, Mystery Shopper; Observational Research, Tourism Education

1. Introduction

As interdisciplinary and experiential approaches are becoming more relevant within the scope of tourism education, with institutions seeking to bridge the gap between theoretical and practical learning and reinforce industry-academia collaboration (Forristal, 2022; Costa et al., 2023; Melo, Mouta & Pereira, 2023), there is a growing interest in promoting initiatives that combine and crosscut these domains. Based on this premise and focussing on the Mystery Guest methodology – a widely adopted industry practice that remains underexplored in educational contexts – this paper describes two innovative pedagogical initiatives that combine service training with applied research activities within this scope.

Aiming to embed the Mystery Guest methodology into structured learning environments, both projects were developed in close collaboration with industry stakeholders, having relied on observational methods to engage students as both participant observers and active research agents, challenging them to work in real-world hospitality settings by taking on the role of customers/guests/visitors. Following an introductory stage, in which they were introduced to the methodology and the key concepts of service delivery, students selected different research objects (i.e., restaurants or ateliers) having developed checklists to be used in their visits, as to support their observation and data collection and ensuing assessment and development of recommendations for improvement.

These learner-centred activities, which reflect the principles of experiential learning (Kolb, 1983, Rosenkranz, 2021; Vasconcelos et al., 2024), were supported by faculty facilitators and are aligned with current academic paradigms that advocate for research-based and research-oriented learning (Healey, 2005; Quintela & Durão, 2022), at the same time they address industry demands for graduates who are equipped with applied research skills and who can translate academic knowledge into practical competencies (Smith, Butcher, Litvin & Frash, 2015).

The following sections will provide a more detailed overview of the methodology, and the activities carried out within the scope of both projects, putting forward the frameworks used, as well as a brief description of their implementation and the challenges faced both by students and faculty. The final section will describe the key takeaways and plans to further develop the projects, reflecting on their affordances when it comes to developing students' awareness regarding research methodologies and their manifold applications.

2. Context and Methodology

This paper describes two different projects developed at the School of Hospitality and Tourism (ESHT, Portugal), one focussing on the restaurants/catering sector, and another dealing tourist activities, most specifically, an initiative designated "Curated Porto: Creative Itineraries, which integrates art studios and ateliers. Despite their differences, as they involved students from different programmes and courses, both projects shared the same principles, having resorted to a common approach to foster students' research and critical thinking skills. Stemming from the need to foster pedagogical innovation and encourage applied research activities, the shared conceptualization process originated from a group of teachers who felt the need to foster pedagogical innovation and encourage applied research activities, which could be perceived as relevant and engaging by students and showcase the practical application of different research dimensions and methods.

In both cases, students were challenged to carry out research activities based on the mystery shopper methodology, bearing in mind specific learning outcomes and goals. In addition to developing key transferrable skills such as teamwork, collaboration and communication, students were, therefore, expected to: 1) gain a deeper understanding of the purpose and importance of mystery shopper methodology in hospitality and tourism; 2) identify key service quality criteria to be applied in specific contexts; 3) apply and crosscut content from different courses; 4) become aware of the relevance of applied research within the scope managerial and tourism and hospitality education; and 5) gain insights into industry standards and quality benchmarks.

Even though the origins of mystery shopping trace back to the 1940s (Beck, Lalopa & Hall, 2004) and that the concepts related to quality assurance and operational standardization are consistently discussed within the context of tourism and hospitality education and training (Anantharajah, Lin, & Tian, 2020) the topic of mystery shopping is often relegated to a minor component within programs, with very little information being available on the training of mystery shoppers (Beck, Lalopa & Hall, 2004). Nevertheless, considering that many companies, including major international hotel chains often resort to this methodology, and that it is perceived as being comprehensive and cost-effective (Mathe & Slevitch, 2011), making it possible to collect a large amount of information (Oronsky & Chathoth, 2007) and "observe service in its natural setting" (Dutt, Hahn, Christodoulidou & Nadkarni, 2018, p. 473), it is important that tourism and hospitality students develop a working understanding of its potential as part of their training (Anantharajah, Lin, & Tian, 2020).

Moreover, despite its relevance and perceived potential, the methodology's application in pedagogical contexts remains underexplored, with this gap being made more evident by the increasing market demand for graduates capable of transferring and applying academic knowledge in practical, workplace contexts (Smith, Butcher, Litvin & Frash, 2015, p. 265), making a case for the development of applied educational projects that cultivate skills such as observation and critical thinking (Smith et al., 2015; Quintela & Durão, 2022). Based on these assumptions, and the idea that, in order to develop managerial skills, students must first acquire practical know-how and have a working understanding of different work settings (i.e., various sectors and departments and how they operate) the projects described in this paper aimed to support the use mystery shopper methodology, having drawn on different stages research process in this scope (Liu et al., 2014; Turner, 2012).

The mystery shopper research process involves several key phases. The first phase – Phase 1 – involves the definition of specific research objectives that align with the client's goals (i.e., you must determine what will be assessed and with what purpose) (Lai & Chang, 2013; Liu et al., 2014). Phase 2 – Planning and Design – involves target/location selection. Within the scope of the projects two different methods were used – for Project 1:

"MyGuESHT - Mystery Guests Real Insights: Application of Mystery Guest Technique in a Food and Wine Service", students used the digital platform "The Fork" to select the establishments to be audited, whereas in Project 2: Project 2: "MyGuESHT - Mystery Guests Real Insights: Application of Mystery Guest Technique in a Creative Tourism Itinerary", the potential targets were pre-selected, as they encompassed all the artists/ateliers integrated in the "Curated Porto: Creative Itineraries" project, which involved a partnership with the Porto Tourism Council (PTC). Bearing in mind span and scope of both projects, there were slight adaptations to the research processes' implementation, notwithstanding the compliance with the work of Liu et al. (2014). The existence of previously defined criteria and categories provided consistency and supported the ensuing

discussing on the observation criteria and checklists to be developed and used by the students, with the support of faculty members (acting as facilitators). These checklists followed a three-tiered structure, based on framework proposed by Liu et al. (2015), considering the pre-visit, visit, and post-visit phases.

Following the discussion and validation of the checklists, students carried out their assessment, having visited the target locations posing as customers (Phase 3). Based on the introductory seminar on the methodology, students were free to design different scenarios and take on different personas, depending on their goals. The specific phases and approaches which will be further explained in the following section, as will the debriefing process (Phase 4 – Wrap up).

2.1 Project 1: “MyGuESHT – Mystery Guests Real Insights: Application of Mystery Guest Technique in a Food and Wine Service”

The Interdisciplinary Project MyGuESHT – Mystery Guests Real Insights: Application of Mystery Guest Technique in a Food and Wine Service” was carried out with 2nd year Hotel Management and Restaurant and Catering Management undergraduates (first semester – 2024/2025). The project focused on the mystery guest methodology as a catalyst for active learning in the field of food and wine service. The project aimed to foster students’ awareness towards mystery guests and the role this methodology can play in the field of food and wine service, while raising their awareness and support the development of creative, critical thinking and research skills through the identification of operational gaps and the proposal of sustainable and operational solutions. Having been implemented in the School of Hospitality and Tourism (Polytechnic of Porto, Portugal), the project was divided into four phases:

- Phase 1 – Objective definition
- Phase 2 – Planning and Design
- Phase 3 – Implementation
- Phase 4 – Wrap-up

The initial phase of the project consisted in the systematic definition of objectives, evaluation parameters, and data collection tools designed to assess service quality. This stage encompassed collaborative planning sessions, the development of guiding documents and templates, as well as the establishment of appropriate assessment methodologies.

Considering the cross-disciplinary and cooperative character of the project, Phase 2, Planning and Design, began with an initial joint session and the formation of work groups. This kick-off session aimed at defining the overall objectives, implementation stages and deadlines, all of which were negotiated with students. Throughout the process, several collaborative initiatives were undertaken, including technical visits and audit simulation activities designed not only to support and inspire students, but also to foster a reliable support network. Drawing on the work of Dutt et al. (2018), who carried out an extensive review on the most common requirements for Mystery Shoppers, the initial phases of the project focussed on developing training-related elements such as Anonymity, Reporting, Data Collection Skills and Industry Knowledge. As for implementation (Phase 3) it was divided into three stages: pre-visit, visit, and post-visit.

2.1.1 Pre-visit

In line with the sequential phases typically associated with mystery shopper research (Liu et al., 2014; Turner, 2012), this preliminary step involved the articulation of each group's research objectives. The design of the assessment checklist followed a triangulated methodological approach, integrating three key sources. Firstly, the model advanced by Liu et al. (2015), which outlines the evaluation standards used by Michelin inspectors during mystery client assessments. Secondly, the research design of Linderová et al. (2019), which employed the same methodology within a broader project focused on evaluating service quality in the restaurant sector. Thirdly, a practitioner-based resource in the form of a 40-step operational guide, proposed by faculty mentors, was also incorporated. Input from student-led discussions further enriched the development process. This

iterative, collaborative process culminated in a multi-layered and adaptable evaluation tool, suitable for diverse hospitality contexts.

Following the design stage, each group selected a restaurant for evaluation. This task was facilitated by the use of the digital platform The Fork, which ensured methodological consistency while allowing filtering based on typology, price range, and other relevant criteria. Once the venues and goals were defined, the groups

formulated customised evaluation checklists aligned with their research focus. These instruments were subsequently reviewed and refined through consultations with academic mentors and professionals in the field.

2.1.2 Visit

After receiving targeted training in observation and data collection—delivered through role-play simulations in a controlled learning environment – students engaged in on-site evaluations. Acting as standard customers, they visited the selected establishments and observed the complete service sequence in real time. While maintaining adherence to the predefined assessment criteria, groups were encouraged to experience distinct scenarios of service interaction. Immediately following each visit, they documented their findings using the standardised checklists, which enabled the collection of both qualitative data (through narrative descriptions) and quantitative data (via numerical scoring), thereby ensuring a comprehensive and systematic assessment of the service experience.

2.1.3 Post-visit

Following the visits, students produced an analytical report that included a description of the experience, an analysis of the data collected, and the identification of strengths and areas for improvement. The purpose of the report was to foster written communication skills and critical synthesis, fundamental pillars in hospitality management education (Baum, 2020). These reports were assessed in accordance with predefined criteria related to both technical accuracy and communicative effectiveness.

The final phase (Phase 4) involved the public presentation of each project in an open session. This concluding stage was designed to reinforce the experiential learning process by fostering peer-to-peer knowledge exchange and encouraging the dissemination of key findings and effective practices. This closing activity did not only facilitate reflective feedback but also contributed to reinforcing students' connection with the industry, in line with the principles of the experiential learning framework (Kolb & Kolb, 2009).

2.2 Project 2: “MyGuESHT - Mystery Guests Real Insights: Application of Mystery Guest Technique in a Creative Tourism Itinerary”

The project (MyGuESHT) was developed with a group of 3rd year Tourist Activities Management undergraduates within the scope of a Tourism Quality Management course at the School of Hospitality and Tourism (Polytechnic of Porto, Portugal). The course aims to enable students to further their knowledge of Quality Management, including key issues such as the application of diverse evaluation tools, including the mystery guest methodology. By challenging students to design and apply the mystery guest approach, the project provided them with an opportunity to develop core competences, such as critical thinking, creativity and collaboration, which are increasingly valued by employers. The project took place in the second semester of the academic year 2024-2025, between March and April, and followed a four-phase sequence, the details of which are outlined in the ensuing lines.

2.2.1 Phase 1 – Design and Planning

In this phase, the pedagogical team involved in the project held a series of preparatory meetings to define the project's objectives, prepare all the support materials to be provided to the students (mostly bibliography on the mystery guest methodology, and discussions on the project's assessment methods and its weight in the overall assessment of the course). As the project aimed to provide the students with an authentic real-world scenario, discussions were also carried out to identify the case to be explored through the project. Given the ongoing collaboration between the research team and the Porto Tourism Council (PTC), the project “Curated Porto: Creative Itineraries” was selected. The Curated Porto Itinerary integrates 13 locations (artistic studios and ateliers) which are open to tourist visits, promoting an immersive tourist experience, by giving visitors the opportunity to engage with the artists, take part in workshops and go on detailed visits to the venues. As a recent initiative of the PTC, the itinerary and the experience curated by the artists had not previously been assessed, making it a suitable case for the objectives of the MyGuESHT project.

2.2.2 Phase 2 – Kick-off

In the first class of the semester, the challenge was presented to the students, who had the opportunity to share their preliminary insights about the methodology and clarify some questions raised after the initial

discussion. Five working groups were voluntarily formed by the students (23) who quickly organised themselves and chose the venues (each group would have to visit at least 2 of the 13 included in the itinerary).

2.2.3 Phase 3 – Operations

In the operational phase students performed several tasks, following the mystery shopper research process proposed by Liu et al. (2014) and Turner (2012). In the planning and design phase, the groups created (collaboratively and in a classroom setting) a checklist which can be framed by three main stages of a tourist experience: the pre-visit, the visit, and the post-visit stage. The checklist is a pivotal instrument for the mystery guest methodology's application, as the overall results depend on the accuracy of the evaluation criteria/questions, which should be defined in accordance with the service delivery process and the potential failure points (Hesselink et al., 2004). In this case, the checklist included a total of 40 criteria, 25 of which were measured using a 5-point likert scale. The remaining 15 were yes/no questions, as the main aim was to assess the existence or non-existence of certain facilities and/or conditions. Just as an example, the criteria considered covered different topics such as the welcoming reception by the artists, hospitality, the organisation of the experience, the clarity of the communication, and the overall impact of the activity on the experience provided by the artist/ venue.

At this stage, the groups also developed a buyer persona which they considered to represent the profile of visitors looking for this type of experience/activity.

All the scheduling of visits was also carried out at this stage, as well as the development of an online form to record the observations made by each student on each visit. Adapting the checklist to a digital collaborative form (using Google Forms), accessible to all students, was deemed to be the most effective approach for ensuring data collection and facilitating subsequent analysis.

Most of these tasks were carried out in the classroom, thus ensuring follow-up and feedback from the teaching team, who also observed the performance of the groups and the main needs/ difficulties identified. Regarding the visits, they were carried out independently, as was the recording and analysis of the data.

Finally, in the post-visit phase, and in addition to the analysis carried out by each group, a debate and sharing session was organised in which all the students were able to report their impressions of the results obtained.

2.2.4 Phase 4 – Wrap-up

Finally, a wrap-up session was held at the end of the semester, where both students and teaching staff presented their perceptions on the methodology and its suitability for the project's objectives.

3. Key Takeaways and Final Remarks

Even though the mystery shopper methodology is well-established within the tourism and hospitality sectors, its application in pedagogical contexts – particularly in the context of student training – remains underexplored. This gap is particularly relevant given the increasing demand for graduates capable of translating academic knowledge into practical, workplace-relevant skills. As a result, the development of applied educational projects that foster observation and critical thinking is not only innovative but also highly relevant.

While the literature documents numerous interdisciplinary projects within the field of tourism and hospitality education, the projects described stand out for their innovative nature, namely, by integrating service training with empirical research, actively involving students in the research process and fostering close engagement with industry stakeholders, allowing students to monitor real-world service delivery processes and suggest evidence-based improvements.

The implementation of mystery shopper methodology with Hotel and Restaurant and Catering management students yielded several notable outcomes. Overall, there was a high level of student engagement and adherence to the project structure, with most groups demonstrating strong commitment to the defined objectives and evaluation framework. In the case of the Tourist Activities Management students, the also findings confirm the relevance and suitability of this methodology for assessing the quality of the tourist experience, and its potential for replication in other contexts. While the need for precise improvements to the checklist was recognized, the students exhibited a high level of commitment and motivation to carry out the project as the methodology implies a considerable amount of autonomy as well as creativity.

The immersive and practical nature of the activities appeared to enhance student motivation, as evidenced by their proactive involvement during the planning, execution, and reporting stages. It should be noted that time management emerged as both a challenge and a learning opportunity, as the project required students to coordinate schedules, conduct fieldwork efficiently, and meet academic deadlines, a process that fostered greater autonomy and accountability. Furthermore, the reflective component of the post-visit reports revealed a progressive development of critical thinking skills, particularly in the analysis of service quality and the articulation of constructive feedback. The combination of experiential learning and real-world application contributed to a deeper understanding of operational standards and customer experience dynamics.

Ethics Declaration

This study did not involve sensitive personal data. As such, ethical approval was not required in accordance with the relevant institutional and national guidelines.

AI Declaration

Artificial intelligence (AI) tools were used during the preparation of this manuscript for language editing purposes only. Specifically, tools such as ChatGPT and Jenni.ai were employed to improve clarity and format references. No AI-generated content was used in the formulation of research ideas, data analysis, or interpretation of results. All substantive intellectual contributions are the original work of the authors.

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Structural Equation Modelling in Marketing: A Systematic Review of Methods and Models

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Abstract: This article presents a systematic review of structural equation modeling (SEM) applications in marketing studies from 2014 to 2024, thoroughly examining methodological developments and emergent trends. Following PRISMA guidelines, we systematically searched Scopus, Web of Science, EBSCO Business Source Premier, and other databases, identifying 85 peer-reviewed marketing studies utilizing SEM from an initial pool of 1,245 records. Our comprehensive analysis reveals a significant shift in methodological preferences: while covariance-based SEM (CB-SEM) continues to dominate in theory testing contexts and prestigious journals with psychology orientations, partial least squares SEM (PLS-SEM) has gained substantial traction, particularly in European and emerging market research. This trend is most pronounced for complex models with non-normal data, formative constructs, or predictive objectives. The decade witnessed several crucial methodological innovations that have transformed SEM practice, including the heterotrait-monotrait ratio for discriminant validity assessment, the MICOM procedure for testing measurement invariance, and PLSpredict for out-of-sample predictive validation. Marketing applications show diverse implementation patterns across subdomains—consumer behavior models typically employ CB-SEM for theory confirmation, while digital marketing and B2B relationship studies increasingly favor PLS-SEM's flexibility. We provide detailed analysis of eight exemplar studies that illustrate these patterns across various marketing contexts, highlighting how methodological choices align with research objectives. The controversy surrounding PLS-SEM usage is critically examined, with particular attention to the ongoing debate about its statistical properties and appropriate application conditions. Despite these advancements, our critical evaluation identifies persistent deficiencies: inconsistent measurement quality reporting, insufficient justification for methodological choices, and underutilization of advanced techniques like Bayesian approaches, segmentation, and longitudinal modeling. This integrative review synthesizes methodological debates and application contexts, providing clear guidelines for selecting appropriate SEM methods based on research objectives, data characteristics, and theoretical foundations. Our findings inform future research directions, emphasizing the need for greater methodological transparency, rigorous validation procedures, and integration with emerging analytical approaches such as machine learning and big data analytics.

Keywords: Structural Equation Modeling, Marketing Research, Covariance-Based SEM, Partial Least Squares SEM, Systematic Review

1. Introduction

Structural equation modeling (SEM) has emerged as a crucial analytical tool in marketing and consumer research, enabling researchers to examine intricate theoretical models comprising latent constructs and multiple relationships concurrently. By the mid-2010s, SEM was broadly regarded as a technique of choice for theory testing and development in marketing (Hair et al., 2014). Both the covariance-based SEM (CB-SEM) school (Jöreskog's 1970s LISREL tradition) and variance-based partial least squares SEM (PLS-SEM) tradition (Wold's 1980s path modeling) have been used pervasively in marketing research. The period from 2014 represents an era characterized by rapid expansion and methodological advancement in SEM applications within marketing research. Earlier reviews (Hair et al., 2012) indicated consistent growth in SEM applications within top marketing journals through 2010 (Ramli et al., 2018). The mid-2010s witnessed significant methodological innovations, including Henseler, Ringle, and Sarstedt's (2015) introduction of the heterotrait-monotrait (HTMT) ratio for advanced discriminant validity testing, rigorous protocols for multi-group invariance in PLS-SEM (Henseler et al., 2016), and increased emphasis on predictive model testing (Shmueli et al., 2019). Meanwhile, debates regarding PLS-SEM versus CB-SEM intensified. Advocates of PLS-SEM highlighted its strengths in handling complex models and prediction-focused studies (Guenther et al., 2023), while critics argued that PLS is often misused and potentially inappropriate for marketing modeling unless properly justified (Rönkkö et al., 2023).

This article systematically examines empirical marketing research using SEM from 2014 to 2024, with two primary objectives: (1) to track how SEM methods were employed in marketing research during this period, and (2) to critically reflect on methodological advancements and challenges, commenting on enhancements in SEM practice. By integrating insights from diverse studies and examining eight exemplar papers in depth, we provide a narrative review of trends and implications for research. We aim to clarify best practices in SEM usage and outline conditions under which each SEM approach is most appropriate, thereby informing SEM's role in marketing research methodology and offering recommendations to ensure higher levels of rigor and relevance in future SEM-based research.

2. Methodology

2.1 Review Design

A systematic literature review was conducted following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review encompasses empirical marketing research published between 2014-2024 that employed structural equation modeling (CB-SEM or PLS-SEM) as a primary analytical method. We also included high-impact methodological papers that directly influenced SEM practice in marketing during this period.

2.2 Data Sources and Search Methodology

Our search strategy encompassed multiple academic databases: Scopus, Web of Science (Core Collection), EBSCO Business Source Premier, and Google Scholar. We developed search strings combining keywords for SEM and marketing domains. A representative query string was: ("structural equation model" OR SEM OR "partial least squares" OR PLS) AND (marketing)*. We supplemented these with terms for marketing subfields (e.g., consumer, brand, advertising, retail, B2B, services) in separate searches and limited results to publications from 2014-2024. To ensure comprehensive coverage, we manually searched tables of contents from top-ranked marketing journals and cross-referenced citations from initial papers through a snowballing approach.

2.3 Inclusion and Exclusion Criteria

Studies were included based on three primary criteria. (1) Domain – Marketing: The study addressed a marketing or consumer research problem (e.g., online marketing, branding, customer behavior). (2) Method – Structural Equation Modeling: The primary data analysis employed SEM, including covariance-based SEM (using software like AMOS, LISREL, Mplus) or variance-based SEM (PLS-SEM with tools like SmartPLS). (3) Empirical, Peer-Reviewed: We focused on peer-reviewed empirical papers presenting new data, excluding purely conceptual writings, editorials, theses, and conference papers unless published in proceedings and widely cited.

2.4 Evaluation and Selection

Our search yielded 1,245 records after removing duplicates. Following title and abstract screening, 310 articles remained for full-text evaluation. Of these, 85 studies met all inclusion criteria and formed the basis for our review. The most common reasons for exclusion at the full-text stage were that analyses did not employ SEM as claimed or that the context was insufficiently focused on marketing.

2.5 Data Extraction and Synthesis

For each included study, we extracted publication year, journal, marketing subdomain, sample characteristics, SEM type used (with software information), and main substantive findings. We also noted methodological characteristics such as use of multi-group analysis, formative measurement models, and reported model fit statistics. We conducted a narrative synthesis, categorizing studies by theme and method. First, we examined trends in SEM approach usage over time. Second, we selected approximately eight exemplar studies that were either highly cited or representative of specific trends, which are discussed in detail within our findings section. We integrated methodological insights by combining findings from empirical studies with methodological literature advances. Quality assessment focused on the methodological rigor of SEM application in each study, evaluating whether authors adequately reported reliability, validity, goodness-of-fit, or other indicators of model quality.

3. Findings and Results

3.1 Trends in SEM Usage: CB-SEM vs. PLS-SEM and Volume of Studies

Our review confirms SEM's consolidated importance in marketing research over the last decade. The volume of marketing studies employing SEM increased steadily year-on-year, with a substantial proportion of empirical articles in leading marketing journals utilizing some form of SEM for data analysis. Researchers increasingly tackled complex models with multiple mediators or moderators, leveraging SEM's capabilities to handle second-order constructs (higher-order factors) and simultaneous equations. This development aligns with Hair et al.'s (2014) observation regarding marketing's "increasing need to assess complex multiple latent constructs and

relationships." A notable trend is the increased adoption of Partial Least Squares SEM (PLS-SEM) relative to Covariance-Based SEM (CB-SEM) in many marketing contexts. In the early review period (2014-2015), CB-SEM was slightly more common overall, especially in North American journals or those with a psychology/consumer behavior orientation. However, by the late 2010s, PLS-SEM usage had surged, particularly in journals focused on managerial or applied topics (Industrial Marketing Management, Journal of Business Research, Journal of Retailing and Consumer Services). Our analysis shows that by 2019-2020, approximately half of the SEM-based articles in our sample utilized PLS-SEM (up from roughly 30% in 2014). This parallels Sarstedt et al.'s (2022) observation that PLS-SEM has become an "essential element of marketing researchers' methodological toolbox" in the last decade. Authors frequently justified their choice of PLS-SEM over CB-SEM based on (1) Model complexity – PLS can more easily handle complex models with many constructs and indicators without convergence problems. (2) Prediction focus – when the goal is forecasting or identifying key predictors rather than confirming theory, PLS is preferred for maximizing explained variance (Low et al., 2021). (3) Less restrictive assumptions – PLS makes no distributional assumptions and can work with smaller samples, appealing when data are non-normal, or sample size is constrained. For example, Low et al. (2021) explicitly stated that "PLS-SEM is the appropriate analytical tool" given a data-rich but non-normal context with a relatively small sample ($n \approx 150$). Similarly, Abbasi et al. (2022) employed PLS-SEM in a tourism marketing study linking social media engagement to loyalty because the model involved formative constructs and multiple mediation effects. While these justifications align with methodological guidance, our review of critiques indicates that authors' rationales were "not fully convincing" in some cases. Guenther et al. (2023) observed that researchers sometimes default to PLS-SEM without strong justification or cite reasons like small sample size even when samples are actually large. Regional differences were evident, with European marketing research communities and those in emerging markets showing particular receptivity to PLS-SEM. In contrast, CB-SEM remains prevalent in journals like Journal of Marketing or Marketing Science, reflecting these publications' emphasis on strict theory testing and model fit.

3.2 Methodological Advances and Their Adoption in Marketing SEM Studies

The 2014-2024 period witnessed several important methodological developments that have influenced marketing practice.

3.2.1 Improved Validity Assessment

The introduction of the Heterotrait-Monotrait (HTMT) ratio by Henseler, Ringle, and Sarstedt (2015) represents a significant advancement in discriminant validity assessment. Prior to 2015, most marketing studies using SEM relied on the Fornell-Larcker criterion and cross-loadings. However, simulations revealed these traditional methods often failed to detect discriminant validity issues. The HTMT ratio provides a more reliable measure, with values below 0.85 indicating acceptable discriminant validity.

3.2.2 Overall Model Fit in PLS-SEM

Traditionally, PLS-SEM lacked well-established goodness-of-fit indices comparable to CB-SEM's Chi-Square, CFI, and RMSEA. While early attempts to introduce fit measures for PLS between 2014-2016 were met with caution, attention shifted toward bootstrapping-based confidence intervals and the HTMT for quality checks. Henseler et al. (2016) argued that model fit assessment in PLS-SEM should focus on predictive relevance and hypothesis testing rather than forcing CB fit indices (Schuberth et al., 2023).

3.2.3 Multi-Group Analysis and Invariance Testing

Prior to 2015, multi-group SEM in PLS was conducted in an ad-hoc manner by running separate models and comparing path differences via t-tests. A significant advance came with the MICOM procedure (Measurement Invariance of COMposites) proposed by Henseler et al. (2016), which provides a systematic three-step method to test configural, compositional, and scalar invariance in PLS-SEM before multi-group comparisons, using permutation tests.

3.2.4 Handling Formative Measures

The period saw clearer guidelines on implementing formative (reflective-formative) measurement models in SEM. Marketing constructs such as perceived value or service experience are sometimes modeled formatively, and PLS-SEM naturally accommodates these structures.

3.2.1 Prediction-Oriented Assessment (PLSpredict)

A major recent advancement by Shmueli et al. (2019) has been the integration of out-of-sample prediction assessment into SEM analysis. The PLSpredict procedure creates holdout sample predictions of endogenous constructs and evaluates metrics like Q^2_{predict} , supplementing traditional explanatory measures with tests of model predictive performance (Low et al., 2021).

3.2.5 Bayesian SEM

Bayesian structural equation modeling, which allows incorporation of prior information and better handling of small samples, represents another advanced approach. Despite its prominence in psychology, our review found very few marketing studies explicitly using Bayesian SEM, despite its recognized advantages (Palomo et al., 2007).

In summary, the past decade brought substantial improvements in SEM methodology, with marketing gradually incorporating many of these advancements. Discriminant validity and composite modeling tests have enhanced standard practice, while prediction-oriented techniques are beginning to appear in published research.

3.3 SEM Applications in Key Marketing Subdomains

3.3.1 Consumer Behavior and Psychology

Many SEM studies examine classical consumer behavior models grounded in theories like the Theory of Planned Behavior (TPB), Technology Acceptance Model (TAM), or stimulus-organism-response (SOR) frameworks. Ramayanti et al. (2024) applied PLS-SEM to evaluate direct technology acceptance drivers and indirect effects of trust and habit on digital payment adoption, finding that attitude and social influence significantly predicted intention to use e-wallets.

3.3.2 Branding and Brand Equity

SEM is extensively used in branding research, where constructs like brand equity, brand loyalty, and brand trust are central. A common approach is to treat brand equity as a second-order latent construct with first-order dimensions such as perceived quality and brand associations. Gudergan et al. (2025) modeled retailer brand equity as a second-order construct influencing consumer loyalty both directly and indirectly through customer satisfaction and word-of-mouth advocacy.

3.3.3 Services Marketing and Customer Satisfaction

Service quality and customer satisfaction models have a long history with SEM. Throughout 2014-2024, researchers continued examining drivers and outcomes of service satisfaction across industries. Khan et al. (2018) tested how perceived service quality dimensions affect satisfaction and continuance usage intention, reinforcing the theory that improved service quality enhances satisfaction and drives retention.

3.3.4 B2B and Relationship Marketing

In business-to-business marketing, relational constructs such as trust, commitment, satisfaction, and dependence form complex networks often examined via SEM. Gansser (2021) developed a dual-trust model examining how trust in the service firm and trust in the contact salesperson build overall commitment, which then drives future purchase intentions.

3.3.5 Digital and Social Media Marketing

The rise of social media has led to SEM being applied to understand effects of electronic word-of-mouth, influencer credibility, and online engagement on consumer decisions. PLS-SEM is particularly popular in social media studies, potentially due to many such investigations emerging from contexts like tourism and education (Dhingra et al., 2023).

4. Discussion

This systematic review reveals a dynamic interplay between methodological innovation and practical application of structural equation modeling in marketing research over the past decade. Here, we discuss the broader implications of our findings and provide recommendations for improving SEM usage in marketing research.

4.1 SEM's Impact on Marketing Theory and Practice

SEM has been instrumental in advancing marketing theory by enabling researchers to test complex conceptual models that mirror the multifaceted nature of marketing phenomena. Multivariate theoretical frameworks involving multiple mediators, moderators, or higher-order factors have become more common in top marketing journals, facilitated by SEM's capabilities. Moreover, SEM's ability to handle latent constructs has reinforced the use of abstract theoretical concepts in marketing. Constructs like "brand love" or "customer engagement" gain empirical validation through SEM methods that can assess their measurement properties and examine their influence on outcomes. From a practical perspective, marketing managers benefit from SEM research that quantifies key drivers of outcomes. The incorporation of prediction-oriented assessments like PLSpredict bridges theory and practice, demonstrating that some SEM models can forecast future behaviors or KPI outcomes with reasonable accuracy.

4.2 Navigating the PLS-SEM vs. CB-SEM Debate

4.2.1 When to Use CB-SEM

CB-SEM remains the preferred choice when researchers have a well-established theory, reflective measures, sufficient sample size, and interest in overall model fit and comparative model testing. It provides global fit indices that allow researchers to reject or fail to reject hypothesized model structures—an essential aspect of theory falsification. The standard recommendation is to use CB-SEM for theory confirmation and comparison, multi-group analyses with established scales, and testing nested models or constraints.

4.2.2 When to Use PLS-SEM

PLS-SEM is appropriate for exploratory or prediction-oriented research, particularly when identifying key predictors among many candidates or building predictive models with new or composite constructs. In early stages of theory development, PLS-SEM's robustness to small samples or non-normal data can facilitate analysis when CB-SEM might not converge. PLS-SEM also offers advantages for formative constructs and complex models with many indicators relative to sample size.

Researchers should explicitly justify their choice of SEM technique based on these considerations, demonstrating alignment between analytical approach and research objectives.

4.3 Future Directions for SEM in Marketing

Our subdomain analysis highlights several promising directions for future research. Firstly, integration of unstructured data- Digital marketing and social media studies increasingly need to integrate unstructured data (text, clicks) with SEM, suggesting potential for combining SEM with text mining or machine learning approaches. Secondly, longitudinal SEM- Branding research could benefit from longitudinal SEM to model brand equity development over time, employing latent growth modeling or panel SEM techniques. Thirdly, publication bias assessment- As PLS-SEM facilitates publishing complex models, future meta-research should compare effect magnitudes reported in PLS-SEM versus CB-SEM studies in similar domains to test claims of potential overestimation. Fourthly, methodological rigor – this review identified inconsistent reporting of measurement quality and model fit across studies. Future research should adhere to established guidelines for transparency in SEM reporting. Lastly, advanced techniques- Underutilization of advanced approaches like Bayesian SEM, segmentation, and nonlinear modeling represent an opportunity for methodological advancement in marketing SEM applications.

5. Limitations of the Review

While we aimed for comprehensive coverage, some relevant studies may have been missed despite our thorough search strategy. Additionally, our qualitative synthesis involves subjective interpretation, though we mitigated this by triangulating with published methodological audits. Finally, as SEM continues to evolve, our conclusions reflect this specific timeframe (2014-2024) and should be viewed as capturing current trends rather than fixed methodological truths.

6. Conclusion

While we aimed for comprehensive coverage, some relevant studies may have been missed despite our thorough search strategy. Additionally, our qualitative synthesis involves subjective interpretation, though we mitigated this by triangulating with published methodological audits. Finally, as SEM continues to evolve, our conclusions reflect this specific timeframe (2014-2024) and should be viewed as capturing current trends rather than fixed methodological truths.

Ethics Declaration

This article is a scholarly academic work that does not involve data collection from human participants, human samples, or interventional research with human subjects. It contains theoretical analysis and literature review only. As such, no ethical approval was required from an institutional review board or ethics committee.

AI Declaration

In the preparation of this manuscript, AI tools were utilized to assist with limited aspects of the writing process, specifically for language editing, grammar checking, and formatting suggestions.

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PhD Research Papers

A Grounded Theory Study of Gender Dynamics in Business in Moroccan Private Schools

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Abstract: This study combines empirical research into the management of private schools in Morocco with a critical review of some of the dominant theoretical frameworks developed by North American and European researchers to understand the impact of gendered social structures on attitudes of and towards female private school owners and their approach to their managerial activities and the business output as a whole. The first part of the thesis excavates the legacy of Morocco's complex colonial and post-colonial history with specific reference to the private school sector and provides a critical foundation of the research subject contextualisation. Using grounded theory, my empirical research starts with the replication of Geert Hofstede's 2013 Value Survey Module (VSM), initially to a pilot study of 76 (67 female and 9 male) private school teachers and management teams in the region of Agadir in Morocco. Analysis of the results of the VSM found that its definition of Masculinity and Femininity produces incoherent results when applied to these settings. Further, the score for Morocco published by Hofstede in 2003- and the one obtained as part of this (2017-2019) research were on opposing poles 53 and 11.5, respectively. The limitations of the results of the VSM required further empirical research through ethnographic observations and interviews with the owners and/or managers of these private schools. This qualitative research found that women, more than men, tended to distance themselves from set characteristics attributed to a gender, and instead put forward the common interest of the organisation as their critical value motivation. Success and motivation were not gender-bound, and gendered norms were seen as circumstantial and not fundamental. The research found that male and female dynamics were governed by economic imperatives rather than by gendered norms. I use this historically grounded reading of Moroccan-specific gender dynamics to challenge the universalist assumptions of cross-cultural management approaches such as Hofstede's. My research provides the basis to deepen our understanding of the context and impact of gender dynamics within business organisations in other regions of Morocco. It is research that remains alive to the impact of globalisation on southern political economies—in and through being anchored to the specifics of historical, linguistic, and cultural places.

Keywords: Grounded Theory, Hofstede, Morocco, Post-colonial, Gender, Education

1. Introduction

Does it still take a woman to teach and nurture and a man to lead and rule?

Is a female teacher better than a male teacher for the 6 years old child?

Which is more Masculine: European or African societies?

Which is more authoritative in Arab countries: Men or women?

Which is closer to Europe: England or Morocco?

Is entrepreneurship and family compatible?

Would you rather work under the commands of a man? or a woman?

Would you only recruit men, or only recruit women? Is that sexism or are you keeping households economically afloat?

Would you use a framework that guarantees arithmetic precision in assessing organisational gender throughout nations, worldwide?

Take a minute and think about it...

The present introduction is taken as an opportunity to situate the study within its interdisciplinary landscape.

1.1 Morocco and the Enterprise: a Northern Perspective

A woman is in the minds of many more nurturing; she understands and acts in a better moral way around youngsters. Through this logic, teaching has been established as 'one of the highly feminised "semi-professions" like nursing and library-keeping. Feminisation has contributed to teaching's low status. Teaching's low status has allowed its feminisation' (Boyle, 2004 [no pagination]). Kachuck (1981) argued that supply and demand market factors were 'inextricably intertwined with the ideology of a woman's place'. She explained that schools, in their

role of maintaining the existing social order, perpetuate social hierarchies; women are (in this view) teaching male-dominant values, and therefore establishing the acceptable knowledge and rules of behaviour in schools and society. Anker (1997) argues that the characteristics of female occupation mirror the common stereotypes of women and their supposed abilities. A notion of cultural stereotypes being fed into the education system is furthermore prolonged because 'many pioneers in women's education espoused the logic of their replacement to be trained by female teachers' (Drudy et al., 2005, p. 18).

The feminized features of the education domain mark the private school sector in Morocco and emphasise its characteristic as a business that privileges women as the main creators and directors. It feeds on - and is fed by - the fact that the core service is education, which is still today seen as a feminine occupation and reported as a female-friendly recruitment field, both in the private and the public sectors. The Organisation for Economic Cooperation and Development reported that 92% of all primary teachers were women (2017), qualifying teaching as a woman's world that is subject to a worrying 'slow but steady feminisation' (OECD, 2020 in (Katsavora, 2020) [no pagination]). The new entrepreneurial sector belongs to "Madame" colloquially referring to the "Modern, Moroccan female-boss".

1.2 Private Primary Schools: an Invisible Cash-cow

According to the Moroccan Ministry of National Education (2014), the private sector accounted for 10% of the national education/teaching workforce, around 60% of whom are female teachers in primary schools. They are rarely found in the managerial levels of businesses. The percentage of women holding managerial roles of listed companies averages 11 %, while that of female union representatives merely reaches 0.40% (ESEC, 2012). Little is reported on the particularities of the private schooling sector, underlining an unreported aspect of the movements in this area.

Investigating this business environment is simultaneously challenged and informed by the lack of reported data and information regarding its particularities. This specific segment is quasi-invisible, moving and burgeoning undercover. Although it is acutely proliferating, and despite there being specific degrees and years of professional experience required as prerequisites to becoming school runners, managers, and teachers, little information is made available to the public. It is similar in its reported existence to those informal work categories in developing countries; where women are the main actors but where their participation is omitted due to the lack of a clear definition of educational or vocational paths leading to such forms of entrepreneurial economic activities. In Morocco, it is referred to these activities as the Informal Sector (le secteur informel).

The understanding of the concept of the informal economic sector emerges from the fact that female labour is often studied and reported-upon through distinctive biases that underline its defining features (Rodary, 2002): The first feature is that women's economic participation and labour is approached almost exclusively through the waged work structures. This automatically excludes the types of work that do not belong to a defined structure, and that happen at home or in informal settings (streets, Hammams / public baths, wedding venues... etc.). Secondly, the work of women is often associated to the schooling of girls/women, therefore excluding types of work that do not require a traditional form of learning or that are not formalised with the obtaining of a diploma. The third feature is the association of women's work with an immediate exposure to the public sphere and how it excludes all types of work that happen at home or in a customer's house. When looking at Morocco, the first two parameters are extremely representative of the context at hand. The third one, however, does not fully apply to this study, since schools are likely to start from homes, concerted rooftops, or garages.

1.3 Moroccan Gender: A Southern Perspective

According to Fatima Sadiqi, 'Moroccan culture is of type that strongly constrains the behaviour of men and women' (Sadiqi, 2003, p. 17). This country that is outwardly homogenous and mono-religious is deeply heterogeneous in nature, aligning Mediterranean, Arab, Amazigh, African, Muslim, Modern, and Traditional as its defining identities. Authors describe this multitude of identities as incoherent to anyone looking for the secure and comforting logic of Cartesian 'rational behaviour'. Mernissi (1987) explains that 'If we try to grasp the complexity of the situation in which individuals act and reflect on their actions (...) then what seems incoherent becomes intelligible in its existential context' (Mernissi, 1987, p.12). The fact is that Morocco's history is based on a tradition of orality and is therefore still incomplete. Gender politics, feminist projects and thoughts are furthermore 'imbricated in modern and traditional discourses on religion, culture and the nation' (Ftouni, 2011, p. 163).

Gender perception and subversion in Morocco could be considered as the result of distinctive components: Geography, Islam, Orality, Multilingualism, Political system, Economic status, History, and Social Organisation (Sadiqi, 2003). Eight complex components are considered in the elaboration of an interpretation of gender dynamics in one country, as opposed to frameworks that develop models that allow the definition of gender across all cultures, globally.

Sadiqi's (2003) linguistics and history-based framework and Mernissi's (1987) sociological one both conclude that gender dynamics are dependent on Family, Education, Economic activity, Religion, Tradition, Sex, and Modernity. An approach that offers a technical advantage in addressing the concern raised by this study's rationale, which is the generalisability and the standardisation of the traditional scientific method in studying the diverse and complex sociological matter. It is in turn an argument that sustains the idea that social issues are directly linked to the way power and hierarchies are diffused in a specific area and under specific conjunctures; they can therefore not be critically examined through approaches that are detached from these specificities. What is more engaging in a local sociological reading of gender dynamics is that gender subversion comes as a naturally constructed and lived notion alongside gender perception, rather than a bi-standing collateral event that is independent or alienated from the main concept of gender (Sadiqi, 2003).

1.4 The Rationale

The subject of this research study is sitting at a crossroads between disciplines of sociology and gender studies on one side, and business organisational studies on the other. Thus, I opted for to look at the question of gender in business in Morocco through the Cultural dimensions' framework. In his model, Hofstede (1967-) conceptualised the different aspect of culture that interferes and shape the way employees work. Hence, he identified indexes of Cultural dimensions, against which employees from 102 countries were scored and collectively ranked (according to their country) on a scale from 1 to a 100. These Dimensions are: Power Distance, Individualism vs. Collectivism. Uncertainty avoidance, Long-term Vs. short term orientation, Indulgence Vs restraints, and Masculinity vs. Femininity. The study focuses on the later since it is the dimension that measures gender roles in society and the extent to which cultures can be either masculine - with more assertive, achievement-concerned men -, or feminine - where the dominance is to nurturing and tender roles. Parallel to that, I opted to combine this framework with Mernissi's (1987) gender dynamics, where male and female realities are subject to a complex set of parameters, induced by private and public tensions and development, historically, culturally and economically.

As a result, I connected a seemingly theoretically unbridgeable gap by going to the roots of each framework and defining the building blocks of each theoretical perspective on what makes the Masculine and the Feminine. Figure 1: 'Merged Masculinity, Femininity and gender dynamics markers' summarises the merged theoretical concepts and the way they result in one coordinated reading grid of the masculine and the feminine from this stand point:

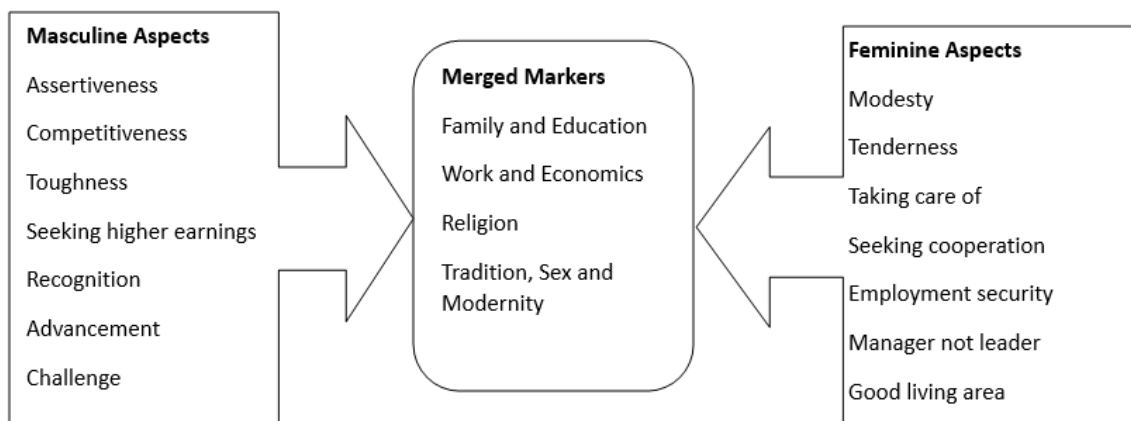


Figure 1: 'Merged Masculinity, Femininity and gender dynamics markers'

Hofstede's (Hofstede et al., 2010) assumes that that societies must be investigated and understood through the individuals' behaviours, and the functioning of specific aspects of their environments, such as families and school systems, religion, and consumer behaviours. Yet, the framework and specifically the Masculinity vs. Femininity

dimension appears to assume that 'all societies are knowable, in the same way, from the same perspective' (Connell, 2007, p. 44). I use Connell's Southern Theory to elucidate the occurrence of such assumptions in the traditional scientific approach.

1.5 The Aim

The economic output generated by the private schools, together with the way these micro-social organisations identify and process the cultural dynamics, also make them part of the global socio-economic landscape, feeding into and fed by the environment within which they thrive. It is this area of perpetual conflict and reversible reactions that determines the focus of this study and that opens a debate between what is presupposed and what is real in this unreported world, through the words of the main actors in the field.

The research is investigating how gender dynamics – in their capacity as socially systemic gendered relations – are patterned within the organisations. The examination will determine how they influence the development of the entrepreneur, the running, and the output of the private primary schools. The research admits that thus far the lack of local studies and academic knowledge, or the dated nature of the scarce academic sources makes it so that it would be arguable to confirm how specific patterned segregations are embedded in this sector.

By doing so, and throughout its process, the research puts forward accounts of the context, collected from direct makers of this sector in Morocco from one side, and creates a stage where disciplines and sources are cross defined, both in nature and in method. Since the research admits that there are fundamental scientific truths have been somehow tainted with a form of obtuse vision that generally takes the known world as the source and then compares the other to it, the research is an opportunity to open up a dialogue between Northern and Southern intelligentsia, and reopen the borders between management and sociology.

2. Methodology

The empirical investigation was divided into two phases:

Phase one is the quantitative study of the organisational culture of male and female values and preferences in Moroccan private schools as businesses. The field exploration started with a pilot study, which used Hofstede's cultural dimensions framework. The study was based on the Value Survey Module (Hofstede and Minkov, 2013), involving 88 owners, directors and employees from 10 different private schools and ran for two months over June to August 2017.

Phase two is the qualitative investigation designed as a response to the methodological shortcomings and limitations of the VSM 2013, and the technicalities of ethical clearance and participants enrolment revealed by the pilot. Phase two consisted of semi-structured and closed-ended questions of eight owners and directors of different private schools between May and July 2019.

In combining qualitative and quantitative methods, and in allowing the research to feed into the field work and vice-versa, the study was seeking to establish a mechanism through which data would be sieved, and methods would be put to the test. Multiplying approaches enabled a better control of the coherence in the quality of the fieldwork. All raw data mined was allowed to inform the research design, and a subsequent step in the field work was only valid when it was not weakened by filed observations. The mixed methods strategy was one where every step filtered-out incoherency, and simultaneously, where the result of the research depends on the presence of all components, resulting in a context-specific, non-generic and up-to-date set of findings. The following illustrates the way the approach to this study was envisioned, namely Figure 2: My funnel strategy for mixed methods.

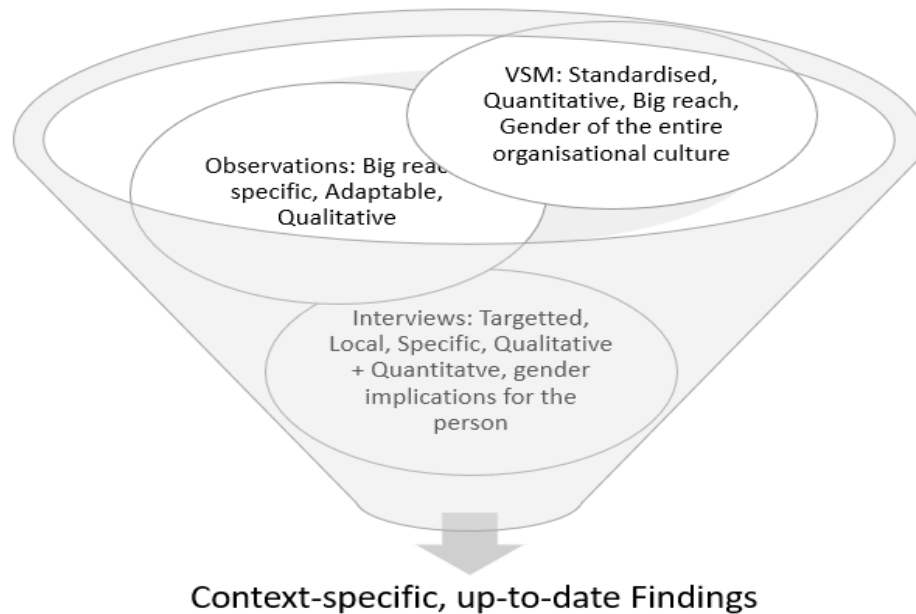


Figure 2: My funnel strategy for mixed methods

2.1 Grounded Theory

Grounded theory is a general methodology for developing theory that is grounded in data systematically gathered and analysed according to Glaser and Strauss (1967). It stems from a constant movement between raw data and analysis and therefore relies on ‘an analytic approach and features ‘a general method of [constant] comparative analysis’ (Corbin and Strauss, 1994. P. 273). It is furthermore suitable to research related to changes across individual and group behaviours - specifically within management. Goulding (2005b) explains that ‘the main thrust of this movement was to bridge the gap between theoretically ‘uninformed’ empirical research and empirically ‘uninformed’ theory by grounding theory in data’ (p: 41).

Accordingly, grounded theory is not only self-evident as a methodology, but it also joins the reasoning developed through the research in the way it takes a stance where empirical, systematic research should be at the heart of knowledge generating when it comes to contexts that have seldom been investigated.

2.2 Data Analysis for the Pilot: the VSM Index Calculation

The Masculinity/Femininity Index (MAS or Mas Index) is defined and calculated as follows, according to instructions provided by Hofstede and Minkov (2013)

Masculinity Index (MAS)

Masculinity is the opposite of Femininity. Masculinity stands for a society in which social gender roles are clearly distinct: men are supposed to be assertive, tough, and focused on material success; women are supposed to be more modest, tender, and concerned with the quality of life. Femininity stands for a society in which social gender roles overlap: both men and women are supposed to be modest, tender, and concerned with the quality of life.

The index formula is $MAS = 35(m05 - m03) + 35(m08 - m10) + C(mf)$ in which m05 is the mean score for question 05, etc.

The index normally has a range of about 100 points between strongly feminine and strongly masculine countries. C(mf) is a constant (positive or negative) that depends on the nature of the samples; it does not affect the comparison between countries. It can be chosen by the user to shift her/his MAS scores to values between 0 and 100.

2.3 Data Analysis for the Ethnographic Study

The data was continuously analysed throughout data collection so that the empirical investigation could meet the needs of the field and those of the study. This started with the analysis of observations, which better informed the administration of the Pilot (Phase One) as well as the recruitment of the participants for the ethnographic study (Phase Two). For interviews, there were two distinct analysis approaches:

2.3.1 Data Analysis for Closed Interviews

First, a value was allocated to each answer, following whether it is a Yes, No, or Non-Applicable (N/A). These values were as follows: **Yes = 1**; **No = 0**; N/A = 2. Answers from the questionnaires were extracted and plotted on a table, using Excel, according to Participant name, Gender, and Value allocated to answer. Colour markers were also added to these values to help with visual recognition of a pattern in the occurrence of one: Green for Yes, Yellow for No, and no colour for Non/applicable. Results were then aggregated and analysed according to levels of similarity or discordance in answering, according to gender of the participant. This allowed a direct assessment of implication of the personal narrative within the Hofstede’s quantitative framework.

2.3.2 Data Analysis for the Semi-structured Interviews

All interviews were translated and transcribed manually, since there was no transcription program available that can transcribe the Moroccan dialect. However, using a transcription program (<https://transcribe.wreally.com>) that could slow down the speech pace was very helpful. I used NVivo to identify recurring themes and nodules. It helped by layering notions pertaining to gender dynamics in the organisations, either through their definition in Hofstede’s framework or in the way they came through participants’ accounts of their realities.

Thematic analysis took shape within the study as also a more organic analysis choice for its close relation with discourse analysis and grounded theory. A strategy that allowed the ‘interpretative story about data in relation to the questions and the encoding qualitative information’ (Boyatzis (1998), cited in Clarke and Braun, 2014, pp. 21–22) according to and therefore merge meanings stemming from the data and emerging codes coherently.

The analysis was made through the constant thematising and coding of emerging meanings in the realm of Masculinity, Femininity, gender dynamics, and the way these all are portrayed within the organisational environment, and beyond, according to the interviewees.

The research benefitted from this strategy in the way it provided a rich account of meanings and truths, which reflected in an extensive set of raw data. The treatment was challenging due to an extended work of translation and transcription, but it had provided a rich thematising ground added the findings in legitimacy.

The following (Figure 3) illustrates the evolution of the themes and the codes within the grounded approach of the field work.

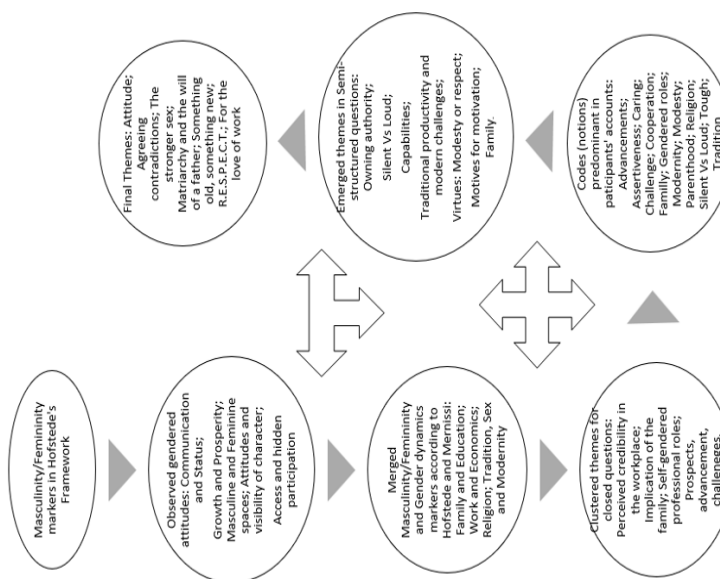


Figure 3: Chart illustrating the movement and relation between the codes and the themes evolution.

3. Findings

At a score of 11.5 on the MAS Index, the pilot study has concluded that Morocco has a very high Feminine organisational culture, which means that it is a culture where individuals are axed on values of security, cooperation, need to live in desirable area, and steer away from Masculine values that promote careerism, high earnings, love for challenges and recognition. This score is contrasting with the official score of 53 for Morocco published by Hofstede (2003-) and deemed inconclusive.

Apart from the statistical usage that revealed the gender of the organisational culture, and beyond its undeniable usefulness in linking the research to a first-time accessed field, the cultural dimension's framework quickly ran out of steam, and confronted the research with more perplexing questions than it answered. The very core of the Masculinity/Femininity dimension of Hofstede's organisational culture logic was already put to the test, at this stage.

Observations in-situ confound the original results of Hofstede's VSM in Morocco in doubt. As such, more women than men in organisations have more demanding duties, and career advancement and higher pay were the women's main aspirations. Contrarily to Hofstede's framework which established women as more likely to orbit around tasks and positions where they put forward their caring nature and seek friendly work environments, while men would privilege tough jobs, run after financial and career advancement.

This cohort represents a culture where both men and women have a positive stance towards work, ambition and assertiveness, rather than a gendered one. Men and women both answer in the same way rather than in differentiated, gendered manner where male participants would opt for career advancement and females for nurturing roles. Both men and women prioritise the implications of the notion of family in the personal sphere. Nevertheless, there seemed to be some patterns of gendered norms in the way tasks and jobs are perceived, but these patterns seem to be eclipsed by the extent strive for advancement and achievements in the careers of participants.

The findings of VSM 2013 and a deeper reading into the answering patterns revealed incoherencies in the way it defined gender and cultural normative implications for men and women in the private school sector in Morocco; which was the inception of a new concept, still anchored in what was arguably Hofstede's gendered markers. Moreover, these revealed incongruencies shed light on areas of questioning that pertained to authority, communication patterns, types of motivation, perceived capabilities, the role of tradition, religion or family.

The ethnographic interviewing revealed these cultural markers as themes through which gendered dynamics are created and extended, recycled and then fed back into the organisational environments. A few defining parameters must be underlined here, starting with the way communication is often non-verbal, although very revealing. Then, there is the parameter of rejection of adjectives such as authoritative, yet a complete appropriation of all attitudes that constitute authority. These first two parameters are found equally in both men and women participations. The next parameters, which ultimately divides this interviewed cohort based on gender is the ostentatious attitude of assertiveness adopted by women, when male participants were invariably reserved and neutral in their communication.

This ethnographic phase has also revealed the universality of the significance of the role of the mother in the family, where most participants spoke of the strictness of their mother, and her pivotal role in steering the gendered dynamics within the family. Equally, the notion of contradiction was prevalent in all participations. Respect and capabilities were the two aspects on which men and women positioned their narratives and perceptions in extreme contradiction. First, on respect, women were very expansive and described the centrality of the notion of respect in their life, while men spoke furtively about respect in terms of codes of conduct in the workplace. Second is the notion of male and female capabilities, where women were reiterating that they were more capable than men, that their caring and conciliating inclinations were added values that men would struggle to bring to the table, while men saw that women's nurturing nature, their socially allocated normative roles and their frail physique confirms a form of weakness in women, which inevitably rubs off their approach to their entrepreneurial and managerial duties.

The notion of motivation, which is the focal point of Hofstede's theoretical framework was categorically removed from its ties to gender, and placed as a response to the socio-economic realities of the participants. They did not seem to grasp the reasoning behind the pursuit of certain work/live goals (expressing feminine inclinations according to Hofstede) when money and career advancement were an option. All female

participants showed great motivation and enthusiasm for the pursuit of recognition and pay raise. Work was itself a motivation for all the women in this interview.

4. Discussion and Conclusion

Throughout the research, many themes have emerged to guide the reading and queries of the empirical data in parallel with the theory which became central in explaining the cultural implications of the gendered dynamics regulating primary private schools' organisational environments in Morocco. These themes were: owning authority, silent and loud, capabilities, traditional productivity, virtues, motives and motivation, and family. They were the recurring notions that came through observations and interviews of the participants, from the very specific angle of the masculine and the feminine within the organisational environment and their implications for motivation. These were then sifted to finally give place to concepts that, according to the participants' narrative, delineated the crux of how they lived their normative roles and the scope of these concepts in their private and public lives. The concepts were: attitude, agreeing contradictions, the stronger sex, patriarchy and the will of a father, something old something new, respect, for the love of work.

The concept of authority and Hofstede's Masculinity, and that of respect and attitude, are used interchangeably with gender in this context. I argue that this undermines the scope of a framework that is intended to give precise, financially sustainable management recommendations due to an evident amalgamation of notions. The third concept discovered by the study is that of the stronger sex, or how female and male narrative have completely opposed views on the stronger gender, and the way these views are perpetuated through societal expectations and refuted by women while invisible to men. Also, the notion of motivation and its gendering within Hofstede's framework, and the way it crystallises a form of mislabelling of feminine and masculine aspects, translates in a near context-blindness from that perspective. Likewise, the study exposed the prominent role that the family plays, shaping a locus where the limits of religion, tradition, past and future are continuously put to the test, and where the patriarchy finds its confines within a more dominant patriarchy. Further, I argue that the concept of communication styles in cultures and the sensible role of non-verbal communication in changing the meanings is of central importance to such cultural examinations.

Hofstede's Cultural dimensions framework is representative of a traditional Northern vision of knowledge creation and dissemination, and it is therefore important to understand the differences between Northern perspectives and the Southern realities of the feminine and the masculine. This is also an opportunity to shed light on areas where the Northern and the Southern struggle for mutual comprehension and where there are indications of concordance, including for example, where men and women's fight for a more equitable dynamics in the ultra-modern offices of western-based multinationals mirrored those taking place in small, informal businesses somewhere in Africa.

I conclude that methods and methodologies, and the angle of the investigation are as paramount to the sound running of the investigative study, specifically when undertaken in intercultural contexts. I therefore anchor my discussion in a holistic framework that cannot exclude the method from the finding, and vice-versa. The centrality of interdisciplinarity in knowledge generation, and the crucial role which multimethodological approaches play in reaching more conclusive findings - all the while challenging existing misconceptions or rectifying research trajectories -, is at the heart of the theoretical contribution aim of the present study.

Ethics Declaration

Since my research involve human participants, the cooperation of gatekeepers and took place outside the UK, I declare that I have obtained the Ethical approval from the FREP (Faculty Research Ethics Panel) and the DREP (Department Research Ethics Panel) at Anglia Ruskin University -Cambridge. I declare that no external funds have been acquired for the preparation and completion of this project.

AI Declaration

I declare that I have not used systems based on generative artificial intelligence (AI) In the preparation of this work.

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Stage-Gate Phase of Sustainable Product Development Process in Batik Fashion Industry: A Systematic Literature Review (SLR) and Future Research Agenda

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Abstract: The batik fashion industry in Indonesia faces challenges in adapting to the concept of sustainability, encompassing environmental, economic, and social dimensions. This issue has become increasingly critical due to consumer pressure and government regulations demanding environmentally friendly and socially responsible business practices. However, efforts to develop products in this industry often encounter a gap between sustainable innovation and efficient product management processes. Although the Stage-Gate model has been widely adopted in various industries to enhance process efficiency in product development, there remains limited research specifically integrating sustainability aspects into the Stage-Gate model within the batik fashion industry. Based on a systematic literature review (SLR), this study aims to demonstrate how a sustainable Stage-Gate model can be effectively implemented in developing batik fashion products by addressing environmental, economic, and social sustainability (Triple Bottom Line – TBL). The Triple Bottom Line (TBL) model can be categorized into three primary approaches that reflect the evolutionary stages of sustainability implementation: 1) Stage-Gate Traditional Product Development Process (SGTPDP), 2) Stage-Gate New Product Development Process (SGNPDP), and 3) Stage-Gate Sustainable Product Development Process (SGSPDP). The findings indicate that by adapting the Stage-Gate model to include sustainability elements at every stage of product development, the batik fashion industry can become more responsive to market demands and regulatory requirements while maintaining competitiveness and environmental preservation. This study contributes to the industry by showing that a sustainable Stage-Gate model not only enhances innovation processes but also supports the overall sustainability of the batik fashion industry.

Keywords: Batik Fashion Industry, Stage-Gate Model, Sustainable Product Development (SPD), Systematic Literature Review (SLR), Triple Bottom Line (TBL)

1. Introduction

The Indonesian batik fashion industry, as a vital component of the national creative economy, is increasingly under pressure to implement sustainability principles. This is driven by the global shift toward valuing environmental stewardship, economic responsibility, and social equity in business operations. International consumers are becoming more conscious of the origins of their purchases, often favouring products with ethical sourcing and minimal environmental impact (Eberling & Langkau, 2024). Batik production, blending traditional craftsmanship with modern techniques, poses several sustainability challenges, including excessive water usage and chemical-intensive dyeing methods. Moreover, the industry must address social dimensions, such as fair labour practices and cultural heritage preservation, making sustainable product development a complex but necessary pursuit in a tightly regulated global marketplace (Khoshnevisan, Fog, Baladi, Chan, & Birkved, 2023).

To tackle these multifaceted sustainability issues, the Stage-Gate model offers a promising framework for structuring the product development process within the batik fashion industry. This model divides the development process into distinct stages, each concluded with a “gate” to evaluate progress, especially concerning sustainability metrics. By embedding sustainability checkpoints throughout the development phases, companies can ensure that products align with environmental, social, and economic goals from ideation to commercialization. The model supports data-driven decision-making and encourages incorporating eco-conscious and socially responsible elements, helping firms meet market expectations while optimizing development efficiency (Goworek et al., 2020; Talay, Oxborrow, & Goworek, 2022).

Despite its success in manufacturing and high-tech industries, the Stage-Gate model’s adaptation to sustainability-oriented fashion sectors, such as batik, remains limited. Its conventional application often prioritizes time-to-market and cost-efficiency over environmental and social considerations. This presents a significant challenge for the batik industry, where traditional production techniques are seldom aligned with

modern sustainability standards (Helo, Mayanti, Bejarano, & Sundman, 2024). Existing research has primarily emphasized the model's role in technological innovation, with few studies exploring how it can be reshaped to fit creative and culturally rooted industries like fashion, especially when sustainability is a central concern (Jafari, 2019).

This study conducts a systematic literature review (SLR) to explore how the sustainable Stage-Gate model can be adapted for the batik fashion industry, emphasizing its potential to address pressing environmental, social, and economic demands. The review investigates best practices and sustainability elements applicable to each stage of the model, aiming to guide batik producers in developing products that minimize environmental impact and respond to evolving consumer expectations and regulatory frameworks (Idrees, Xu, Haider, & Tehseen, 2023; Xu, Mei, Liang, & Sun, 2023). By mapping relevant strategies and identifying knowledge gaps, this research seeks to build a practical and holistic framework to assist stakeholders in the sustainable transformation of the batik fashion value chain.

2. Literature Review

This study employed the Systematic Literature Review (SLR) methodology to explore sustainability in the batik fashion industry, aiming to identify trends, gaps, and driving factors behind sustainability integration. The research formulated specific questions, keywords, and criteria to assess how sustainability practices are implemented, measured, and disclosed within the industry. Despite growing environmental concerns, the review found limited academic attention on sustainability approaches in batik fashion. The investigation, as shown in Figure 1, based on secondary data from articles published between 2020 and 2024, and further exploration from 2010, highlights the need for more comprehensive research on sustainable innovation and product development using a structured, deductive approach.

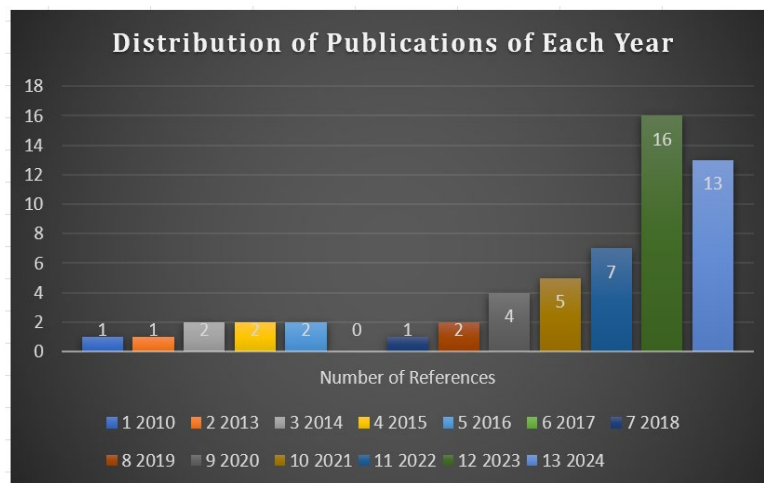


Figure 1: Distribution of Publication of Each Year, 2010 – 2024

The inclusion criteria focused on full-text, peer-reviewed studies in English from the ScienceDirect database, using specific keywords such as "sustainable batik fashion industry" and "batik sustainability" to capture relevant literature from 2010 to 2024. Broader terms like "Sustainability" and "Innovation" were later combined to refine the search. Studies published before 2010 or not in English were excluded, as no relevant research on sustainable batik fashion was found before that year, ensuring the review encompassed the most relevant and recent developments in the field.

The initial step, illustrated in Figure 2 on ScienceDirect, involved employing precise keywords such as "sustainable batik fashion industry," "batik sustainability," "Sustainability," and "Measurement," which yielded 3,967 results. Phase Two: 3,459 studies were excluded after reviewing titles, abstracts, and keywords, as they were unrelated to the concepts of the batik fashion industry, sustainability, measurement, or sustainability reporting. Phase Three in Table 1.: Mapping of 56 Selected Research Publications were subjected to a more detailed review by examining titles, abstracts, keywords, and conclusions related to the topic. Phase Four: The authors meticulously assessed the 56 selected articles for their relevance to the research scope. As a result, 43 studies were eliminated.

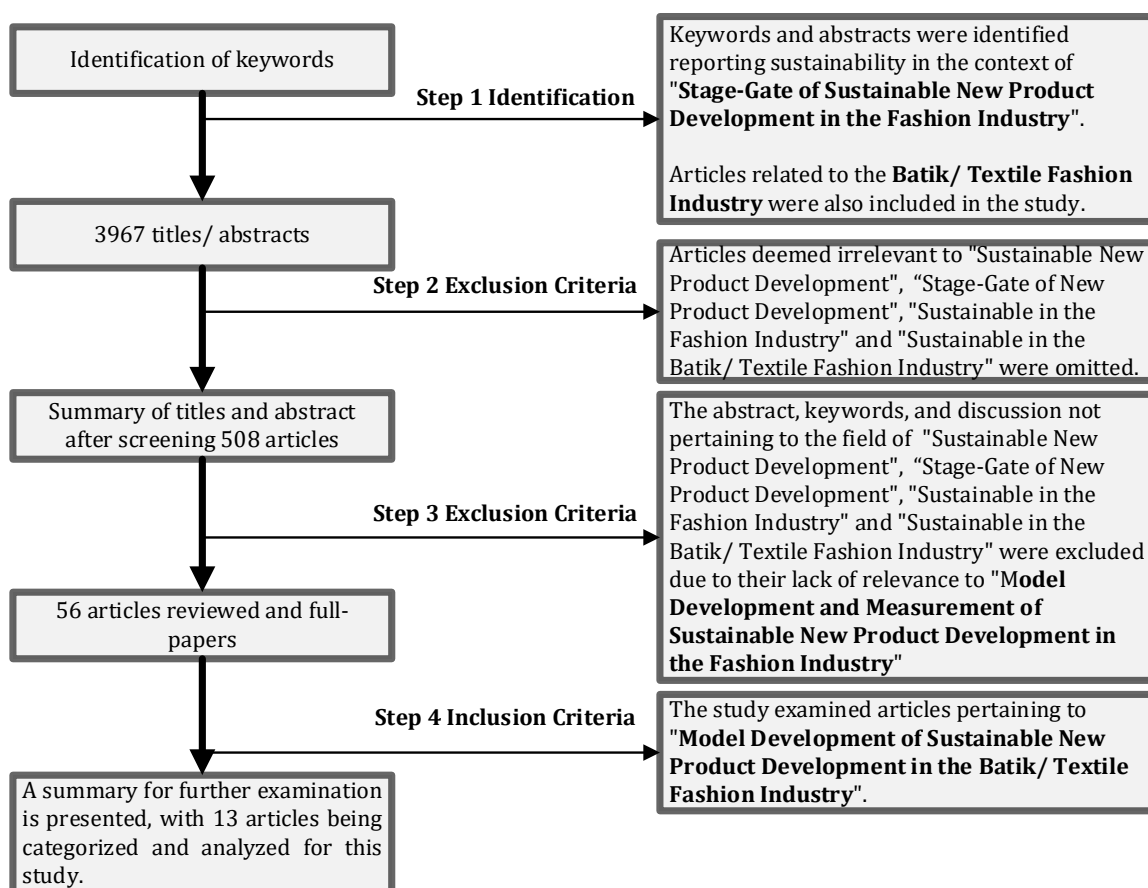


Figure 2: Flow chart of the Research Process

The 56 selected articles in Table 1 reflect a strong alignment with the Triple Bottom Line (TBL) integration—environmental, social, and economic sustainability has become central in sustainable product development (SPD), especially in the fashion and textile sectors. Research often highlights environmental priorities such as lifecycle thinking and sustainable materials (Appolloni, Centi, & Yang, 2023; Watz & Hallstedt, 2022), while others stress the importance of ethical labour and social engagement (Thorisdottir & Johannsdottir, 2019). Economic aspects, like cost-effectiveness and competitive advantage, are also vital (Ma, Adam, Teo, & Wong, 2024). However, balancing all three pillars remains challenging, requiring integrated sustainability indicators to support comprehensive SPD decisions (Rehman et al., 2024).

The Stage-Gate model offers a structured approach to incorporating sustainability across six product development phases: ideation, concept, business case, development, testing, and market launch. Early-phase integration ensures long-term viability (Pedroso et al., 2023), while feasibility analyses during the business case phase support strategic planning (Garcia-Ortega, Galan-Cubillo, Llorens-Montes, & de-Miguel-Molina, 2023). In development and testing, Set-Based Engineering and circular economy methods enhance design efficiency (Miranda, Ponce, Molina, & Molina, 2019). Launch strategies focused on sustainable branding foster stakeholder alignment and market acceptance (Ikram, 2022). These phase-specific tools reinforce sustainability-driven innovation.

Indonesia's batik fashion industry, rich in cultural heritage, offers unique potential for adopting TBL and Stage-Gate models. Yet, challenges such as low awareness and limited resources hinder progress (Demyanova, Colucci, Silva, & Vecchi, 2023). By drawing from global textile insights (Gornostaeva, 2023), the industry can innovate in design and local enterprise while honouring its cultural roots. A context-sensitive SPD roadmap is essential for ensuring environmental, economic, and social sustainability in Batik's future.

Table 1: Mapping of 56 Selected Research Publications

No.	Article	Triple Bottom Line			Stage-Gate NPD							Industry
		Environment	Social	Economic	Ideation	Concept	Business Case	Development	Testing	Market Launch	Fashion/Textile	
1.	(Achaw & Danso-Boateng, 2021)	✓										
2.	(Adamkiewicz, Kochańska, Adamkiewicz, & Łukasik, 2022)	✓										
3.	(Appolloni et al., 2023)	✓	✓	✓								
4.	(Battisini Teixeira, de Medeiros, Kolling, Duarte Ribeiro, & Morea, 2023)	✓			✓	✓	✓		✓	✓	✓	
5.	(Carvalho Garcia, 2023)	✓	✓									
6.	(Chopra, Dong, Kaur, Len, & Ki Lin, 2023)	✓	✓	✓								✓
7.	(Claxton & Kent, 2020)	✓			✓	✓	✓	✓	✓	✓	✓	✓
8.	(Delaney & Liu, 2024)	✓	✓	✓	✓	✓	✓	✓	✓	✓		
9.	(Demyanova et al., 2023)	✓	✓	✓								
10.	(Dissanayake & Sinha, 2015)	✓			✓	✓						
11.	(Efrata & Radianto, 2022)				✓	✓		✓	✓	✓	✓	✓
12.	(Elamri, Zdiri, & Hamdaoui, 2023)	✓								✓		
13.	(Fung, Chan, Choi, & Liu, 2021)	✓	✓	✓	✓	✓			✓		✓	
14.	(Fuxman, Mohr, Mahmoud, & Grigoriou, 2022)	✓	✓									
15.	(Garcia-Ortega et al., 2023)	✓										
16.	(Gmelin & Seuring, 2014a)	✓	✓	✓								
17.	(Gmelin & Seuring, 2014b)	✓	✓	✓								
18.	(Gornostaeva, 2023)	✓										
19.	(Goworek et al., 2020)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
20.	(Harsanto & Permana, 2021)	✓	✓	✓								
21.	(Helo et al., 2024)	✓										

No.	Article	Triple Bottom Line			Stage-Gate NPD							Industry
		Environment	Social	Economic	Ideation	Concept	Business Case	Development	Testing	Market Launch	Fashion/Textile	
22	(Ikram, 2022)	✓		✓								
23	(Jestratijevic, Uanhoro, & Rana, 2024)											
24	(Karadayi-Usta, 2024)											
25	(Ki, Wang, Chong, Chenn, & Ha-Brookshire, 2023)	✓	✓	✓								
26	(Kim, Kang, & Lee, 2020)	✓	✓									
27	(Klemm & Kaufman, 2024)		✓									✓
28	(Kozlowski, Searcy, & Bardecki, 2018)	✓	✓		✓	✓		✓				
29	(Lang, Armstrong, & Liu, 2016)	✓										✓
30	(J. Li, Li, & Fan, 2024)	✓										
31	(Z. Li, Zhou, Zhao, Guan, & Yang, 2024)	✓										
32	(Ma et al., 2024)											
33	(Mazzi, 2023)	✓										
34	(Miranda de Souza & Borsato, 2016)	✓			✓	✓	✓	✓	✓	✓		
35	(Miranda et al., 2019)	✓	✓	✓	✓	✓		✓				
36	(Moon, Youn, Chang, & Yeung, 2013)				✓	✓						
37	(Muenchinger, 2023)	✓			✓	✓						
38	(Nayak, Jajpura, & Khandual, 2023)	✓										
39	(Pedroso et al., 2023)	✓	✓	✓	✓	✓						
40	(Petala, Wever, Dutilh, & Brezet, 2010)				✓	✓	✓	✓				
41	(Peter John & Mishra, 2023)	✓										
42	(Ramos et al., 2024)	✓										
43	(Rehman et al., 2024)	✓										

No.	Article	Triple Bottom Line			Stage-Gate NPD							Industry
		Environment	Social	Economic	Ideation	Concept	Business Case	Development	Testing	Market Launch	Fashion/Textile	
44	(Rese, Baier, & Rausch, 2022)	✓										
45	(Riazi & Saraeian, 2023)	✓										
46	(Spindler, Schunk, & Könecke, 2023)	✓	✓									
47	(Stella, Fraterrigo Garofalo, Cavallini, Fino, & Deorsola, 2024)	✓		✓								
48	(Talay, Oxborrow, & Brindley, 2020)			✓								
49	(Talay et al., 2022)	✓	✓	✓								✓
50	(Tavernaro et al., 2021)					✓		✓		✓		
51	(Thorisdottir & Johannsdottir, 2019)	✓	✓	✓								✓
52	(Thorisdottir, Johannsdottir, Pedersen, & Niinimäki, 2024)	✓	✓	✓								✓
53	(Watz & Hallstedt, 2022)											
54	(Wilson, 2015)				✓	✓						✓
55	(Yang, Al Mamun, Reza, Yang, & Aziz, 2024)	✓										
56	(Zhao et al., 2021)	✓	✓	✓								

A systematic literature review on sustainable new product development (NPD) in the fashion industry identified 13 full-text studies for in-depth analysis, highlighted with boxed indicators in Table 1. These studies emphasize the urgent need for a structured framework integrating traditional craftsmanship with modern sustainability practices in the batik fashion industry. Although sustainability has gained attention in mainstream fashion (Thorisdottir & Johannsdottir, 2019; Wilson, 2015), its implementation in the batik sector remains limited. This study explores key concepts, tools, and gaps in the Stage-Gate framework, as batik SMEs lack formalized development processes (Battesini Teixeira et al., 2023; Efrata & Radianto, 2022).

Key phases of the Stage-Gate process, such as idea generation, concept design, prototyping, and commercialization, are analysed through the sustainability lens. Previous studies emphasize the importance of embedding sustainability at the initial design stage (Claxton & Kent, 2020; Delaney & Liu, 2024) and managing supply chain complexities in later stages (Fung et al., 2021; Talay et al., 2022). Moreover, incorporating stakeholder collaboration and frugal innovation approaches is seen as vital in resource-constrained traditional industries (Goworek et al., 2020; Pedroso et al., 2023). The taxonomy of smart and sustainable products (Miranda et al., 2019) also reinforces the need for integrated tools to support decision-making in batik product development.

This study proposes a conceptual Stage-Gate model tailored to the SPD process in the batik fashion industry. The model synthesizes sustainability strategies from existing literature (Thorisdottir et al., 2024) and offers a

foundation for empirical validation and policy recommendation. Future research should focus on testing the model in real-world batik production to align local heritage with global sustainability goals.

3. Sustainable Product Development Process in the Batik Fashion Industry

This study critically examines the integration of sustainability into the New Product Development (NPD) process within the fashion (textile/batik) industry by proposing a Stage-Gate model. It emphasizes the urgent need to align product innovation with environmental stewardship, social equity, and economic viability.

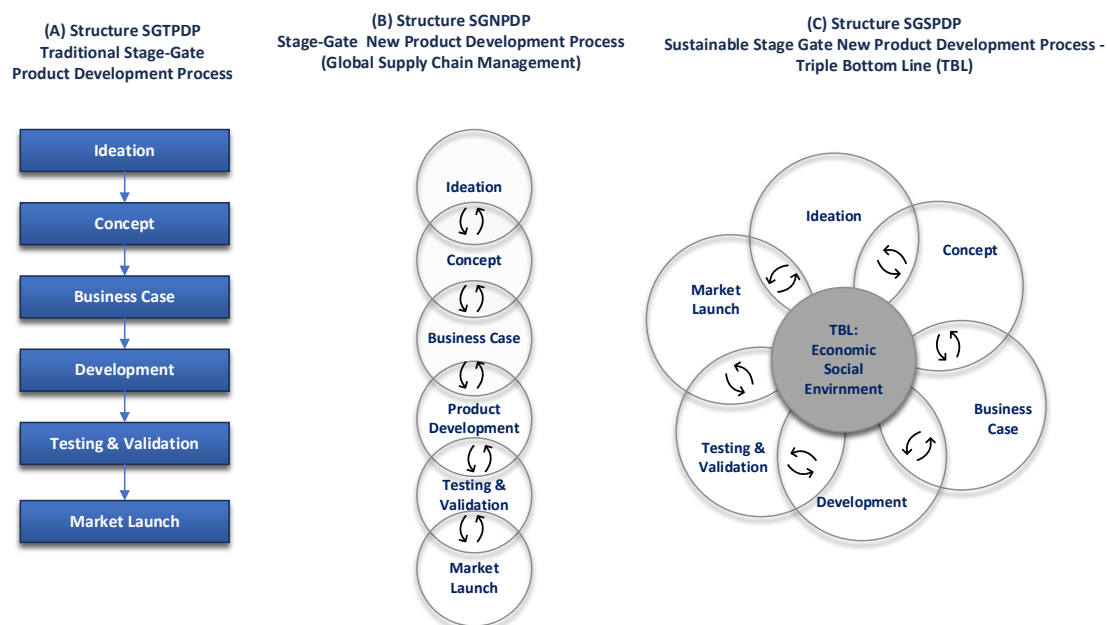


Figure 4: The evolution of fashion product development process (A,B and C Structures) – Integrated Sustainable Stage-Gate: Sustainable Fashion Industry : (Fung et al., 2021) and (Cooper & Sommer, 2016).

By embedding sustainability criteria from the earliest development stages, the model aims to strengthen industry performance while safeguarding Indonesia's cultural heritage. The findings offer strategic guidance for industry stakeholders and policymakers to drive transformative, sustainability-oriented innovation in the batik and textile sectors.

The integration of two primary sources, namely Fung et al. (2021) and Cooper & Sommer (2016), is reflected in Figure 4, which presents an evolutionary structure in three stages: Structure A, B, and C, within the context of the Integrated Sustainable Stage-Gate. These structures demonstrate a gradual transformation toward a more sustainable approach in the fashion industry.

The Stage-Gate Traditional Product Development Process (SGTPDP) represents a conventional, linear approach to fashion product development, emphasizing speed and production efficiency. In this model, decisions related to design, development, and production occur sequentially, often without significant consideration of environmental and social impacts. Sustainability is not a core component; the primary objective is efficiently delivering a market-ready product. In contrast, Structure B, the Stage-Gate New Product Development Process (SGNPDP), begins incorporating sustainability as a criterion evaluated at each development stage. Structure C, the Stage-Gate Sustainable Product Development Process (SGSPDP), advances this approach further by promoting cross-functional collaboration and stakeholder engagement. It ensures that decisions throughout the product development cycle consider not only economic viability but also environmental and social responsibility. This shift from SGTPDP to SGSPDP demonstrates a growing dedication within the fashion industry to adopt innovative processes aligned with global sustainability standards and ethical accountability.

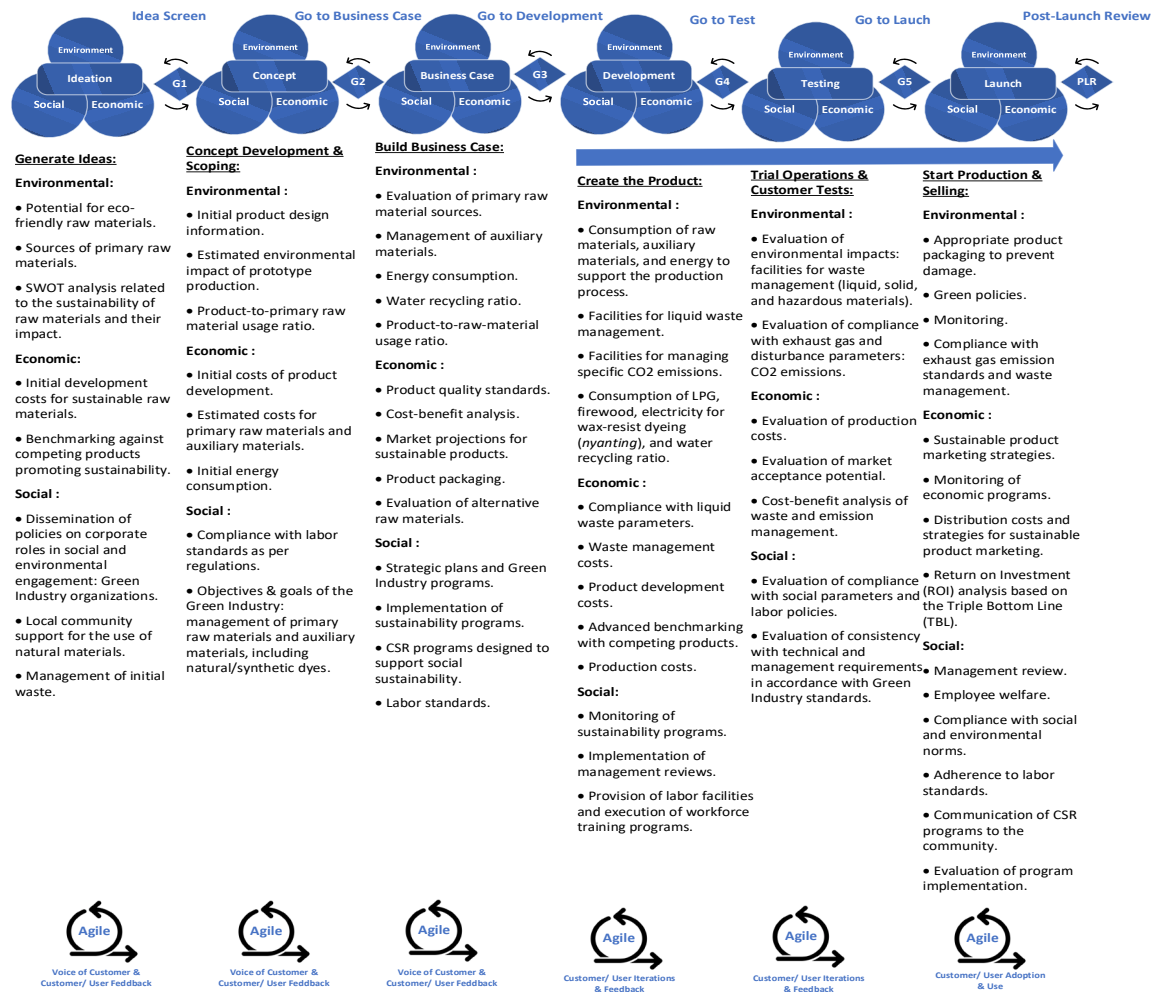


Figure 5: Conceptual Model of the Stage-Gate Phase for Sustainable Product Development Process in the Batik Fashion Industry

The Conceptual Model of the Stage-Gate Phase for the Sustainable Product Development Process in the Batik fashion industry, as illustrated in Figure 5., integrates the core dimensions of sustainability – economic, environmental, and social – into the earliest stages of ideation and evaluation. These pillars form the basis for developing product concepts that balance cost-efficiency, environmental stewardship, and social responsibility. Environmental aspects involve selecting sustainable raw materials and evaluating lifecycle impacts. Economic evaluation includes benchmarking and cost analysis. Social considerations emphasize engaging local communities and strengthening internal sustainability roles to ensure alignment with broader social responsibility objectives.

This model adopts a structured Stage-Gate framework, with critical checkpoints such as “Go to Concept,” “Go to Business Case,” “Go to Development,” “Go to Test,” and “Go to Launch.” Between gates, development is driven by Agile principles, embedding iterative loops and ongoing feedback collection. This responsiveness to stakeholder input ensures that products evolve continuously and remain aligned with sustainability objectives. Integrating customer feedback mechanisms at every stage signifies a commitment to sustainable production, and sustainable value creation that adapts to real-world user needs and expectations.

Crucially, elements like “Voice of Customer,” “Customer Adoption,” and “Post-Launch Review (PLR)” highlight a user-centred, market-oriented approach to sustainability. The model does not treat sustainability as a fixed checklist but as a dynamic and evolving framework. Through Agile integration and a sustainability lens applied across the entire product lifecycle, the model enables the development of Batik products that are not only market-relevant but also ethically and environmentally accountable.

4. Future Research Agenda

This study opens avenues for further research into the application of the Sustainable Stage-Gate Model in the batik fashion industry and beyond. Future research directions may include the following:

1. Empirical Validation: Conduct in-depth field studies to test the SGSPDP framework's practical application, identifying real-world challenges and opportunities across varied batik production settings.
2. Development of Evaluation Tools: Create targeted, data-driven sustainability metrics to measure the Triple Bottom Line impacts at each stage of the Stage-Gate process.
3. Application of New Technologies: Explore the integration of artificial intelligence (AI), big data, or digital platforms to enhance sustainability assessments and inform smarter decision-making.
4. Adaptation for Other Creative Industries: Conduct cross-sectoral research to assess the model's adaptability to other cultural and creative fields such as textiles, crafts, and design industries.
5. Skill Development and Training: Assess the need for capacity building among artisans and SMEs to implement sustainability-focused product development effectively.

5. Conclusion

This study presents a sustainable Stage-Gate model as a vital framework for guiding environmentally, economically, and socially responsible product development in the batik fashion industry. By systematically integrating sustainability principles into each product development phase, the industry can better meet market demands and regulatory standards. Through a systematic literature review, we classified three key approaches—traditional (SGTPDP), new (SGNPDP), and sustainable (SGSPDP) product development—and demonstrated that adopting the sustainable model enhances innovation while aligning with Triple Bottom Line (TBL) goals. The main contribution of this research is the development of a Conceptual Model Stage-Gate Phase of the Sustainable Product Development Process in the Batik Fashion Industry, which not only strengthens measurable sustainability efforts but also lays a foundation for future studies across fashion sectors rooted in cultural heritage.

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Ethics Declaration

The writing of this paper was conducted independently by the authors without the assistance of artificial intelligence (AI) in the creation of the main content, data analysis, or result interpretation.

AI Declaration

AI tools were used in a limited capacity for literature search, language editing, and grammar checking to enhance clarity and readability. All ideas, arguments, and conclusions presented in this paper are entirely the work of the authors.

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Research Sample Saturation in Irish Tech SMEs: A Practical Case Study

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Abstract: Small and medium-sized companies significantly influence global and regional economies, providing a positive business climate and strengthening economic competitiveness. This research study explores the importance of purposive sampling, which has become a research strategy targeting business owners of technological start-ups and small companies, employees in tech giants, and representatives of digital educators and governmental bodies. A comprehensive Bibliometric - Systematic Literature Review (B-SLR) was conducted to identify common practices in the field, aiming to identify potential research gaps and enhance practices that support the development of qualitative research studies. The findings show that methodological choices for research in entrepreneurial development are supported by literature reviews and quantitative approaches. However, there is a lack of samples based on empirical qualitative data. Small purposive samples give valuable insights to researchers, policymakers and academia into an investigated problem despite all limitations and constraints in getting the interviews with CEOs and business owners.

Keywords: Case Study, Small Businesses Research, Technological Sector, Theoretical Saturation.

1. Introduction

Small and medium-sized companies significantly influence global and regional economies, providing a positive business climate and strengthening economic competitiveness (European Commission, 2023; OECD, 2023; Gennari, 2023). Within the business ecosystem, the technological sector is a paramount priority for the European Union, as SMEs help ease the current dependence on foreign companies represented by the world's leading economies, the USA and China (Alesina Marco Tabellini et al., 2022). However, investigating the methodological choices for research in entrepreneurial development shows us that it is mainly conducted through literature reviews and quantitative approaches, while additional systematisation and testing of samples based on the empirical qualitative data is required (Bassey, 1999; Hamilton & Corbett-Whittier, 2013; Yin, 2018). The significance of qualitative research in SME development helps to understand how to alleviate dependencies from multinational corporations and their unpredictable parent country policies. Further aspects to be considered relate to political and economic uncertainty emerging from the Trump's second Administration's approach to global international trade and the implications for business activities that are of particular interest in the case of Ireland. The US multinational enterprises (MNEs) hold a dominant position in Ireland, as per data from the CSO highlighting significant American presence in technological (2.5%), pharmaceutical (0.03%) and services (61%) sectors (CSO, 2025; FAME, 2025).

Ireland shows some level of resilience to geo-economic challenges due to stable consumer spending, supported by a strong labour market capable of decelerating inflation and providing further consumption growth (European Commission, 2024; CSO, 2023). To guarantee the resilience of Irish businesses and high competitiveness in the global market, small companies need to be able to cope with investment attraction, technology implementation, management skills improvement, and direct access to finance (OECD, 2019). Moreover, improving management development standards has become a priority for the Irish government, which is highlighted in Project Ireland 2040, which presents the country's overarching long-term strategy for economic and social development, as the existing competency level in Irish SMEs is insufficient (Ortiz-Martínez et al., 2023; Smith et al., 2022). Considering the importance of the technological sector and the knowledge intensity associated with it, the sector was identified as relevant to support a focused case study aiming to understand practical problems faced by SMEs to provide insights for practitioners, researchers, and policymakers to gain insights on measures and policies that could help reduce their high failure rates of approximately 50% compared to corporations (Bassey, 1999; Hamilton & Corbett-Whittier, 2013; Yin, 2018; OECD, 2019). The case of the technological sector allows industrial policy to integrate approaches aiming to reduce the pressure on small businesses for possible exits from the domestic market, redirecting their markets and supply chains and giving more freedom in using economic resources due to the significant sector growth (Rokhmawati et al., 2021). To achieve technological independence in this crucial sector, fair competitiveness, and zero-emission goals, the European Commission plans to invest heavily in strategic and critical economic

sectors, including climate initiatives and education, specifically green, digital, and technological skills to support the twin transition (European Commission, 2023). At the same time, the focus on the technological sector case grows due to constant automation and uncertainty in future tech leaders' strategies, putting pressure on entrepreneurs in their attempt to find a balance between technologies and human labour (Vrontis et al., 2022; Pereira et al., 2023).

This research study explores the importance of purposive sampling, which has become a research strategy targeting business owners of technological start-ups and small companies, employees in tech giants, and representatives of digital educators and governmental bodies (Grégoire, Barr and Shepherd, 2009; Miles and Huberman, 1994; Palinkas et al., 2015; Campbell et al., 2020). The proposed case study is a sample that integrates 12 interviews with small company owners and eight interviews with the sector representatives, covering predetermined sampling criteria and being in alignment with common practices in research studies focused on SMEs. A comprehensive Bibliometric - Systematic Literature Review (B-SLR) was conducted to identify common practices in the field, aiming to identify potential research gaps and enhance practices that support the development of qualitative research studies (Marzi et al., 2025). Additionally, the sample size was analysed through the studies in the field of social, business and health sciences to help offer critical insights on the relevance of choice of a small purposive sample to achieve data saturation in qualitative study (Eisenhardt, 1989; Saunders et al., 2017; Yin, 2018; Hennink et al., 2016; Weller et al., 2018).

2. Literature Review

In recent years, the role of small companies in the global market has significantly changed, converting them into crucial market players (Yuniarti, 2023). However, SMEs' success is heavily dependent on limited number of core decision-makers, represented by the management teams. Understanding that in many cases, entrepreneurs are self-made individuals without formal degrees, qualitative approach can allow more opportunities to determine guiding strategies for SMEs and approaches for organisational learning, to stay competitive and survive. Qualitative choice is also supported by the rationale of traditional scientific management, which helps in understanding of knowledge acquiring and retaining mechanisms in a simple way (Bhatia & Levina, 2020).

However, exploring entrepreneurship education from an ontology-based learning approach should focus on entrepreneurs' personal growth and development without missing the role of colleagues, practitioners, educators, and the overall environment (Bhatia & Levina, 2020). For sustainable development, SMEs have to operate in conditions of the shift to Industry 4.0 and 5.0 paradigms by emphasising the focus shifts from technical skills to human-centred, putting leadership skills, and the significance of entrepreneurial mindset as critical pillars of the company's development (Ortiz-Martínez et al., 2023; Smith et al., 2022; Reporting Lab, 2021). Thus, identifying different perspectives on effective team learning leads to the Constructivism learning theory for a theoretical framework and team construction and understanding the processes associated with knowledge-sharing and transferability practices (Kop & Hill, 2008; Corbett & Spinello, 2020). However, considering the effects of COVID-19 and the fact that most businesses across entire sectors were completely closed for a significant period, online learning has become a solution to mitigate these negative effects and bring existing learning approaches into the digital space (Mishra et al., 2021).

Considering the importance of the technological sector and the knowledge intensity involved, it was chosen as a case study to understand practical problems faced by start-ups to provide insights for practitioners, researchers, and policymakers (Bassegy, 1999; Hamilton & Corbett-Whittier, 2013; Yin, 2018). Management development involves developing executives' cognitive abilities, aiming to change their behaviour afterwards, aligning online learning with experience-based and digital learning approaches that lead to successful company growth, and building and growing the management team as illustrated in Table 1 (Kuratko, 2005; Kuratko and Morris, 2018). Mapping the common practices in the field, the research has analysed the leading authors and experts in the entrepreneurial education field, synthesising the implemented methodologies to find the main patterns. Having analysed the methodological choices for research in entrepreneurial development (see Table 2), which are mainly conducted through literature reviews and quantitative approaches, additional systematisation of samples based on the empirical qualitative data was required.

Table 1: Concept Framework: from individual mindset to management team development.

Author	Journal [Citations]	Contribution to methodology
INDIVIDUAL Level - Entrepreneurial Mindset, Expertise		
Daspit, Fox, & Findley et al., (2023); Kuratko, Fisher, & Audretsch et al., (2021); Haynie, Shepherd, Mosakowski, & Earley et al., (2010); Kuratko, Hornsby, & Bishop et al., (2005)	<i>Journal of Small Business Management</i> [188] <i>Small Business Economics</i> [387] <i>Journal of Business Venturing</i> [954] <i>International Entrepreneurship Management Journal</i> [311]	Systematic literature review; Literature review; Integrating literature streams from social and cognitive psychology. Survey
Handayati & Narmaditya et al., (2020); Mawson, Casulli, & Simmons et al., (2023); Cui, & Bell et al., (2022)	<i>Heliyon</i> [254]; <i>Entrepreneurship Education and Pedagogy</i> [27] <i>International Journal of Management Education</i> [198]	Survey. Literature review and conceptual framework.
Management Development for Entrepreneurs		
Moshman et al., (1982); Pittaway & Cope, (2007b); Rae et al., (2009); Lackeus et al., (2016); Neck & Corbett, (2018)	<i>Developmental Review</i> [516] <i>Entrepreneurship and Regional Development</i> [2625] <i>Entrepreneurship Education and Pedagogy</i> [1305]	Literature review; Systematic literature review; Policy research;.
Pavlov, (1938); Skinner, (1958); Gagne, (1985); Thorndike, (1999); Baldwin, (2011); Jordan, (2008); Allen et al., (2022)	HBJ College; <i>Academy of Management Learning & Education</i> [128]; New York: Routledge; <i>Journal of Management Education</i> [101]	Survey Literature review and application by integration.
Knowles, (1988); Rogers, (1969); Maslow, (1971); DeCarvalho, (1991); Bass, (2008); Johnson, (2014); Bates, (2015); Tjosvold et al., (2006).	SAGE Publications Ltd London: Constable; <i>Annals of Psychologist; Theory</i> [687], <i>Research and Practice Journal</i> [117]	Comprehensive literature review. Survey.
Bandura, (1986); Kop & Hill et al., (2008); Siemens, (2005); Dunaway, (2011); Brieger et al., (2020)	<i>International Review of Research in Open and Distance Learning</i> [1615]; <i>Elearnspace</i> [155]; <i>Refence Services Review</i> [355]; <i>European Journal of Training and Development</i> [108]	Critical analysis and theory positioning. Structured literature review. Theory exploration and conceptualisation of the main principles.
Dewey, (1938); Piaget, (1957, 1970); Kolb, (1984); Gopnik & Wellman, (2012); Mvududu et al., (2005); Chuang et al., (2021); Archambault et al., (2022)	<i>Psychological Bulletin</i> [987]; <i>An International Journal for Statistics and Data Science Teaching</i> [79]; <i>Performance Improvement</i> [335]; <i>Educational Psychologist</i> [263]	"Theory" grounded in the computational framework of probabilistic causal models. Literature review and knowledge contextualisation.
VENTURE Level - Company Growth		
McAdam, & Reid et al., (2001); Roffe et al., (2007); Decuyper, Dochy, & Van den Bossche et al., (2010); McKeown et al., (2012); Massaro, Handley, Bagnoli, & Dumay et al., (2016); Durst, Edvardsson, & Foli et al., (2023)	<i>Journal of Knowledge Management</i> [647]; <i>Journal of European Industrial Training</i> [40]; <i>Industry and Higher Education Journal</i> [810]; <i>Educational Research Review</i> [317]; <i>Journal of Knowledge Management</i> [56]	Questionnaires and participants workshop afterwards. Analysis of 9 case studies. 18 qualitative in-depth interviews. Integrative and interdisciplinary literature review. Structured and follow-up literature review.
Morrison et al., (2006); Cheng, Wang & Spector et al., (2014); Nambisan & Wright et al., (2017); Mishra, Sahoo, & Pandey et al., (2021); Troise, Corvello, Ghobadian & O'Regan et al., (2022); Kearney & Lichtenstein et al., (2023)	<i>Synergy</i> [234]; <i>Educational Research Review</i> [226]; <i>Strategic Entrepreneurship Journal</i> [102]; <i>Distance Education; Technological Forecasting and Social Change</i> [494]; <i>British Journal of Management</i> [17]	Bibliometric and scientometric analysis and normative framework. Survey of innovative SMEs. Interviews with 20 start-up CEOs.

Source: Authors elaboration (2025).

The study used purposive sampling techniques to achieve data saturation with a small sample, based on an Irish technological sector case study framework. Utilising extensively the semi-structured interviews framework, undertaken with start-ups, small company owners, experts from corporations, digital educators and policymakers, we aim to recognise the optimal and efficient sample that leads to data saturation within working

contexts that are defined for significant difficulties to access data and the limitations and constraints that define SMEs, microenterprises and start-ups when trying to achieve theoretical saturation (Eisenhardt, 1989; McAdam et al., 2007; Bratianu et al., 2020; Matić, 2022).

3. Methodology

3.1 Research Design and Data Collection

The qualitative approach was chosen for this study, aiming to capture entrepreneurs’ views and opinions on strengthening their managerial skills and expertise (Creswell, 2005; Creswell, 2007). Among existing research designs, quantitative, qualitative and mixed methods, the research employs a qualitative approach due to its holistic approach to exploring how entrepreneurial teams can develop during their training by enabling researchers to be deeply involved in the process (Creswell, 2005). Qualitative research has an exploratory background and seeks the answer to “how” and “why” social phenomena to understand social reality; however, these aspects and insights are difficult to capture (Creswell, 2007). Table 2 below provides a comparative analysis of quantitative, qualitative, and mixed methods design that presents the main features: philosophical assumptions, approaches to theory development, research strategies, techniques and research choices.

Table 2: Research design comparison

Quantitative	Qualitative	Mixed method	Research choice
Philosophical Assumptions			
Positivism Interpretivism Realism Pragmatism	Constructivism Interpretivism Realism Pragmatism	Pragmatism Critical realism	Constructivism
Approaches to Theory Development			
Deductive approach (data collected and analysed to test theory); Inductive (analysis is done from the empirical data)	Inductive or Deductive	Deductive or Inductive	Inductive approach
Research Strategies			
Experimental Survey; Action research, Case study Grounded theory	Action Research Case Study Ethnography Grounded Theory Narrative Inquiry	Combination of both	Irish Technological sector case study
Techniques			
Questionnaires Structured interviews	Semi-structured interviews In-depth interviews Observations Reflections	Combination of quantitative and qualitative data collection and analysis techniques.	Semi-structured interviews

Source: adapted from Creswell (2007), Saunders (2017)

Purposive sampling has become a research strategy which targets business owners of technological start-ups and small companies, employees in tech giants, and representatives of digital educators and governmental bodies. Purposive sampling included the following criteria: 1) distinguishing companies for start-ups (less than 5 years in operation), older than 5 years were determined as established; 2) educational companies-providers of digital programs; 3) policymakers, involved in providing digital training support; 4) corporations, that actively

incorporate digital skills (Grégoire, Barr and Shepherd, 2009; Miles and Huberman, 1994; Palinkas et al., 2015; Campbell et al., 2020).

Considering the previous studies in entrepreneurship, which used a qualitative approach, semi-structured interviews with founders/CEOs were used as a primary data collection tool (Eisenhardt, 1989; Kearney & Lichtenstein, 2023). Interviews were chosen for their flexibility, ability to gather rich, empirical data and the possibility to adjust questions according to participants' responses (Eisenhardt & Graebner, 2007; Kallio et al., 2016). Interview questions were guided by previous topic research, and all participants were asked the same questions to ensure consistency (Kallio et al., 2016). The interviews were designed for 40 to 60 minutes.

Triangulation was utilised to strengthen the reliability, validity and trustworthiness of qualitative data (Lincoln and Guba, 1985) to compare findings from empirical data with the theoretical framework and insights from sectoral reports and website information (Tippmann et al., 2013; Lincoln & Guba, 1985). The data collection phase targeted receiving adequate data from the study to answer the research question and fulfil the criteria of data saturation (Eisenhardt, 1989; Saunders et al., 2017). The reviewed literature reveals no agreed method of what to consider data saturation, and different types of saturation techniques and perspectives can be applied, such as theoretical, thematic, meaning, and code saturation (Hennink et al., 2016; Weller et al., 2018). The reviewed literature suggests that theoretical saturation might be reached only when no new information is received (Guest et al., 2006). NVivo software management system was chosen for the data storage and analysis processes, as this software is designed for in-depth exploration and understanding of qualitative data, broadly used in the field of business and management studies (Eisenhardt, 1989; Hennink et al., 2016; Saunders et al., 2017; Weller et al., 2018).

The purposive sample resulted in 20 interviews covering all sampled criteria and being in alignment with the common practices, as presented in Table 3, giving insights into managerial development through digital learning from multiple perspectives. The sample included seven start-ups and five established small companies. Geographically, participants represented the following major Irish cities: Dublin technological hub (80%), Cork (15%), and Galway (5%). Dublin concentrates mainly on multinational subsidiaries of technological giants in line with start-ups, additionally providing supplemental services to various companies in their region and beyond (Sarraipa et al., 2023).

Table 3: Qualitative sample size for data saturation

Author, Date	Journal	H-index	Sample Size	Saturation Goal	Sample Size for Saturation
Ando et al. (2014)	<i>Comprehensive Psychology</i>	31	39	Codes & categories	12 interviews for 92% of codes
Coenen et al. (2012)	<i>Quality of Life Research</i>	170	21	Categories	9 interviews (inductive) 12 interviews (deductive)
Constantinou et al. (2017)	<i>Qualitative Research</i>	93	12	Categories	5 interviews (consecutive) 8 interviews (random)
Francis et al. (2010)	<i>Psychology and Health</i>	108	14	Categories	14 interviews
Francis et al. (2010)	<i>Psychology and Health</i>	108	17	Categories	17 interviews
Guest et al. (2006)	<i>Field Methods</i>	61	60 (2 countries)	Codes	12 interviews for 88% of codes
Guest et al. (2020)	<i>PLOS One</i>	435	40	Codes	11-14 interviews for ~90% of themes
Guest et al. (2020)	<i>PLOS One</i>	435	48	Codes	11-14 interviews for ~90% of themes
Hennink et al. (2017)	<i>Qualitative Research</i>	93	25	Codes	9 interviews for 91% of codes; 16-24 interviews for meaning saturation
Namey et al. (2016)	<i>American Journal of Evaluation</i>	68	40	Codes	16 interviews for 90% of codes

Author, Date	Journal	H-index	Sample Size	Saturation Goal	Sample Size for Saturation
Nascimento et al. (2018)	<i>Revista Brasileira de Enfermagem</i>	34	15	Categories	11 interviews
Turner-Bowker et al. (2018)	<i>Value in Health</i>	132	26	Categories	15 interviews for 92% of concepts
Young and Casey et al. (2019)	<i>Social Work Research</i>	60	15	Codes & categories	9 interviews for ~90% of codes
Kearney and Lichtenstein et al. (2023)	<i>British Journal of Management</i>	142	20	Codes were defined	Saturation was achieved through % of supported answers

Source: Author’s elaboration, adapted from Hennink (2025)

The sample size was cross-checked through the studies in the field of business, social and health sciences, as most relevant to entrepreneurship, to support the methodological choice of achieving data saturation (Eisenhardt, 1989; Saunders et al., 2017; Yin, 2018; Hennink et al., 2016; Weller et al., 2018). As methodological choices for research in entrepreneurial development were illustrated in Table 2 with most studies being supported by literature reviews and quantitative approaches, however, there is a lack of samples based on the empirical qualitative data. Table 3 summarises 13 articles published in high h-index journals, with a qualitative methodological approach to assess the number of required empirical samples to achieve data saturation (Hennink et al., 2016; Weller et al., 2018). A careful analysis of the required interviews showed that an average of 13 interviews is enough to identify more than 90% of the codes and categories. Even though the standard deviation equals 5, meaning that variation can include 8 to 18 interviews, 20 representative samples are illustrated by the reviewed literature to cover this requirement.

3.2 Data Analysis

To start data analysis from individual entrepreneurs’ understanding of management development and possibilities of online learning, broad definitions were applied as part of the coding methodology and to establish the research significance of each interview transcript (Strauss and Corbin, 1998; Kearney & Lichtenstein, 2023). In the first step, coding included breaking each interviewee’s data into particular parts with a focus on the content and inductive qualitative techniques were used in developing ‘in vivo’ codes (similar to open coding) to analyse and reflect the respondents’ language as it generates a very detailed representation of the data (Strauss & Corbin, 1998; Tippmann et al., 2013). Analysis of every interview involved comparing received codes for similarities and differences to include new information into an existing code or create a new one. As understanding of the data developed, similar, thematically under broader codes were defined, which were then summarised, clearly labelled, and defined to avoid ambiguity (Saldana, 2013). The final step was the clustering process to identify relevant themes under higher-level categories, guided by the theoretical framework and emerging themes from the data, helping to integrate and conceptualise the data (Miles & Huberman, 1994; Strauss & Corbin, 2008; Tippmann et al., 2013). The analysis focused on the data structures to support theory building and data analysis (Gioia et al., 2013). According to the previously chosen definition, theoretical saturation in this study was reached after 90% of the interview analysis when no new information and codes were received, supporting the idea of the possibility to achieve theoretical saturation in relatively small samples (Guest et al., 2006).

Small purposive samples give valuable insights into a researched problem despite the numerous limitations in data collection studies involving interviews with CEOs and business owners. Main problems in reaching top managers include owners’ high time constraints, habit to act as “business theorist”, position of power in their organisation, which affects the interviewing process, and concerns about their reputation (Mikecz, 2012). To cope with the above constraints, the study adapted a firm-based, solely interviews approach, as the study tends to get insights from a firm level. Therefore, this approach turned out beneficial in the context of a case-study design (Eisenhardt, 1989). Insights received from a small sample cannot be underestimated, as they shed light on the main constraints and difficulties in SMEs’ stable growth, managing teams and retaining expertise. These insights can guide policymakers and academia in analysis and offering further support for small companies.

4. Conclusion

The development of SMEs is a crucial pillar for the economy, and understanding how entrepreneurs form their strategy to succeed in daily operational performance represents a challenge for researchers (Alesina et al., 2022; Mishra & Zachary, 2015). Analysis of common business and social research practices showed the dominance of various literature reviews and quantitative techniques (Hennik, 2016; Saunders et al., 2017; Yin, 2018; Marzi et al., 2025). However, getting more insights can be possible in a qualitative purposive sample approach (Gennari, 2023). Insights received from a small sample cannot be underestimated, as they shed light on the main constraints and difficulties in SMEs' stable growth, managing teams and retaining expertise. These insights can guide policymakers and academia in analysis and offering further support for small companies.

Ethical Considerations

The Research Ethics and Integrity Committee at TU Dublin approved our interviews (approval: Rec-20-05) on April 28, 2023. Respondents gave written consent for review and signature before starting interviews.

AI Declaration

During the preparation of this work, the authors did not use any AI tools.

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