

Actions for Knowledge Integration capability in Building an Innovative Enterprise: Organizational Perspective

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Abstract: The functioning of modern organizations requires not only the constant collection of information and its analysis, but also adaptation to changing business requirements. Enterprise owners and managers must indicate which directions of development are important for business maintenance, its development or adaptation to changes in the environment. Achieving and maintaining a business competitive advantage depends on the implementation of innovation in individual entities, use of modern technologies, including advanced IT solutions and the construction of processes and knowledge resources focused on the market environment. Knowledge is perceived as the crucial source to gain a competitive advantage, and knowledge management becomes an important element of the entire process of managing an organization. KI or the ability to collect and process specific information resources of an organization is also crucial for business innovation. KI is difficult to achieve, however, it is the basis for competitive abilities of companies. The aim of the article is to identify the capability to integrate knowledge influencing the innovativeness of enterprises. The review of the current subject literature focuses on the analysis of capability in the knowledge integration based on international experience. The article is based on the results of research conducted at the turn of 2021 and 2022 on a group of 355 enterprises operating in Central Europe, where the business innovation level is quite low. Therefore, an attempt was made to set recommendations for activities for knowledge integration for enterprises intending to increase innovation. The analysis of the practical knowledge integration capability is based on statistical analyses allowing for indicating the correlation and dependence between the studied variables. The empirical research using the proposed research tool was the basis for building a knowledge integration model in terms of enterprise innovation. The analysis showed that selected knowledge integration capability positively correlates with the level of enterprise innovativeness.

Keywords: management, knowledge management, knowledge integration capability, innovation, competitiveness

1. Introduction

A particularly turbulent business environment, exposed to permanent changes, requires not only the continuous collection of information and its analysis, but also adaptation to variable internal and external environmental conditions of organizations. The adaptation of enterprises and maintaining a competitive advantage is possible due to relevant internal operations, including knowledge management, consisting of a range of components and actions (Brzostek 2015). Knowledge is considered as the most important source allowing for gaining a competitive advantage, and knowledge management is becoming a vital component of the entire management process of organizations. Knowledge management is an integrated set of activities the objective of which is to properly shape knowledge resources in enterprises to transform the knowledge of employees and knowledge from the environment into resources that allow for gaining a competitive advantage (Probst, Raub, & Romhardt, 2000; Brzostek 2015, p. 35). Following the international literature review, knowledge integration (KI) is an important component affecting the company's performance, the ability to collect and process characteristic information resources, moreover, it is crucial for enterprise innovativeness (Abubakar et al. 2019). KI is difficult to achieve, however, it is the basis for the competitiveness of enterprises (Lyu et al. 2022). Undoubtedly, integration is an important factor in the process of implementation and use of knowledge management in organizations (Mohammed, 2015). On the other hand, implementing innovation in individual entities, using modern technologies, including advanced IT solutions, and constructing processes and knowledge resources directed to the market environment are the conditions to gain the competitiveness of economic entities in the contemporary operating conditions (Morgan et al. 2019; Lyu et al. 2020). Despite a wide range of research into KI and enterprise innovativeness, in the literature, there is certain scarcity of research concerning enterprises with a low level of innovation. Especially in the case of the identification of individual capabilities of employees in the process of the integration of knowledge that builds innovation of the organization.

The aim of the article is to identify the capability to integrate knowledge influencing the innovativeness of enterprises. The review of the subject literature enabled the construction of the model, which was verified based on the results of the own research conducted at the turn of 2021 and 2022 on a group of 355 companies operating in Poland. This part of the EU is characterized by a low level of enterprise innovativeness (Community Innovation Survey 2021), thus, an attempt was made to identify capability to knowledge integration which may affect an increase in the business innovation level. The constructed research tool, subjected to the reliability

analysis, allowed for data collection that enabled verifying the correlations, relationships and the model as well as making recommendations in terms of KI operations for enterprises that wish to increase their innovativeness. The novelty of the research is visible in the identification of selected capabilities of the organization members in the process of the integration of knowledge building the innovativeness of enterprises

2. Literature Review

2.1 Knowledge Integration

Contemporary management conditions, including a high level of competition, unpredictable turbulence of the environment, business instability, exert pressure on the operations and growth of enterprises. Difficult operating conditions and threats from the competitive environment force organizational behavior (Bao, Chen, & Zhou, 2012; Lyu et al. 2020), which contributes to market adaptation. This includes certain behavior in the field of learning and knowledge management (KM). Therefore, according to Brzostek (2015), enterprises, among others, generate the available knowledge from the company's external environment, systematically collect and optimally use knowledge to achieve a competitive advantage, disseminate it among employees, enrich knowledge through its integration and dissemination, and measure the effects resulting from the operations using IT tools. The KM process conceptualization allows the creation of formal mechanisms ensuring the capture, analysis, interpretation, and integration of various types of knowledge, both marketing, technical, and expertise in companies. These mechanisms are complementary to the organization inter-functional coordination; however, it should be pinpointed that knowledge integration (KI) reflects the structures and processes through which different sources of knowledge become integrated to implement common objectives and tasks undertaken within the company's operations. It becomes particularly important in the context of enterprise innovativeness (Ode, & Ayavoo, 2020; De Luca, & Atuahene-Gima, 2007). Therefore, after Caridi-Zahavi, Carmeli and Arazy (2016), it can be indicated that KI is the ability to manage and use the existing and newly acquired knowledge in enterprises. As the company's key ability, KI allows enterprises to acquire, share and use knowledge (Eslami, Lakemond, & Brusoni, 2018), and these activities are a prerequisite for achieving a market advantage.

2.2 Innovativeness of Enterprises

While referring to the previous research, it is assumed that various types of innovation require various sources of knowledge (Snihur, & Wiklund, 2019) and different KM operations (Lyu et al. 2020). Depending on the possessed organizational skills, various activities, including KI, moderate the innovation of products and processes determining enterprise innovativeness (Teece, 2018). Effective organization management depends on innovative activities undertaken, but also on the adopted operation strategy and the possibility of taking risk (Snieska et al. 2020), hence, the company's readiness to deliberately accept risk while taking advantage of innovative opportunities. Therefore, the adopted organizational behavior of enterprises, no organizational rigidity, determine the method of processing and using knowledge in enterprises (Choo, 2013) and its innovation level (Chirico, & Salvato, 2008). Dealing with unpredictable actions and accidental events is characteristic of the innovative environment, in which the change and implemented innovation are essential operations, also in the process of the organizational management function. As indicated by Jensen et al. (2007), the most successful companies in terms of product and process innovation are those the organizational structures of which supports knowledge development through formal research and development processes and expansion of knowledge resources based on experience, practice and interaction between employees, customers, and suppliers. Therefore, more flexible and agile structures are required, which enable interaction and communication between employees, with no rigidly defined functional areas, but with functional integration instead. Such a structure of enterprises open to changes will allow for the development of knowledge based on practical experiences and interactions, consequently using innovative organizational skills (Jensen, et al. 2007).

2.3 The Impact of the Capability to Integrate Knowledge on the Innovativeness of Enterprises

The literature review indicates there are formal relationships between the organization source of knowledge and its scope and area in enterprises, as well as organizational skills, both internal and external, and the level of enterprise innovativeness (Zahra, Ireland, & Hitt, 2000; Zahra, & Nielsen, 2002), where the company's KI is the moderator. The cooperation between employees, also consisting in the exchange of knowledge enables innovation. This happens by recombining appropriate resources to produce innovative solutions (Nerkar, & Roberts, 2004). Consistency between employees and their KI positively influences the development of new products (Guler, & Nerkar, 2012; Nguyen, et al. 2018).

Moreover, De Luca and Atuahene-Gima (2007) indicated that the KI process moderates the relationships between the dimensions of market knowledge and an innovative product (Ode, & Ayavoo, 2020; Atuahene-Gima, Slater, & Olson, 2005). Therefore, an attempt was made to identify the capabilities in the area of knowledge integration that moderate the level of innovation of an enterprises. For the purposes of the study, the following research hypothesis was adopted H1: The capabilities of the members of the organization in the area of knowledge integration have a positive impact on the innovativeness of enterprises.

3. Methodology and Characteristics of the Research Group

The aim of the article is to identify the capability to integrate knowledge influencing the innovativeness of enterprises. The objective was accomplished based on the own research carried out on a group of 355 companies operating in the south-central Poland. The pilot study was conducted prior to the actual research in 2021 on a group of 20 targeted enterprises operating in the south-central Poland. The actual research was conducted at the turn of 2021 and 2022. The study used the author's survey questionnaire, consisting of closed questions and using a 5-point Likert scale based on (Sheng, Zhou, & Li, 2011; Peng, & Luo, 2000), in which the respondents evaluated the phenomenon. The paper-based questionnaire was completed by the surveyed enterprise managers/owners. The participation to the survey was anonymous.

To assess the KI level, the scale by Carlile (2004) was applied, relating to the standard for the communication of the company's staff to understand roles, responsibilities and time needed to implement new projects, common processes required to perform tasks and commonly interpret organizational principles as well as the KI assessment scale by Caridi-Zahav, Carmeli and Arazy (2016) and Lyu et al. (2022), indicating that KI among the company's employees enables the implementation of new initiatives by using internal and external knowledge jointly for new projects and innovative solutions (Ekemen, & Şeşen, 2020). The scale thus created consisted of six items, measuring KI level on a 5-point scale:

- KI_1 Employees in company are capable of applying their expertise to bring new initiatives to fruition,
- KI_2 Employees in company are capable of integrating the external knowledge with their existing knowledge,
- KI_3 Employees in company are capable of integrating and applying the external knowledge to new projects,
- KI_4 Employees of company understand the roles, responsibilities and time needed to complete the task together,
- KI_5 Employees have a common understanding of the processes required to complete the task,
- KI_6 Employees of company interpret the organizational principles in a similar way.

When assessing the I of enterprises, the scale by Li and Atuahene-Gima (2002) was applied, which requires the respondents to evaluate the statements concerning their company's innovativeness level in relation to the main competitors in the last 3 years. The scale created consisted of five items measuring the company's innovativeness level on a 5-point scale:

- I_1 Our company places great emphasis on new product/service development, using vast financial resources.
- I_2 Our company has developed a wide range of new products/services.
- I_3 Our company has made dramatic changes in the existing products/services.
- I_4 Our company has increased the pace of implementation of new products/services to the market.
- I_5 Our company has increased overall commitment to new product/service development.

The research tool constructed for the purposes of the quantitative research was subjected to reliability testing. The method of estimating reliability was used, which is the internal validity analysis using the Cronbach's Alpha coefficient, proposed by Taber (2018). The research showed the correct reliability of the variables - the KI capability was 0.913 and the I was 0.889. Therefore, it can be indicated that the constructed research scales meet the criteria and their use in the quantitative research is justified.

In the next step, it was examined if there were statistically significant relationships between the variables and the descriptive statistics were reviewed to assess the bonds between the I variable and the individual scale items measuring the KI level. Following the characterization applying basic descriptive statistics, the normality of their distribution was analyzed using the Shapiro-Wilk test (Razali & Wah, 2011). It was checked if there was a linear relationship between the variables – thus, the Kendall's tau-b correlation index was used (Schober, Boer & Schwarte, 2018), which is a non-parametric equivalent of r-Pearson. The multivariate linear regression analysis using the stepwise method was also conducted. The data model fitting was assessed with the R2 coefficient (Bedyńska & Cyprińska, 2013). The final model was described and, based on the value of the b coefficient (non-

standardized regression coefficient), it was assessed how other predictors in the model predicted enterprise innovativeness.

Table 1: Characteristics of the research sample

Companies' specification	n	%
	355	100
Company age		
up to 1 year	9	2.53
1-5 years	66	18.59
6-10 years	69	19.44
11-20 years	81	22.82
Over 20 years	130	36.62
Employment level in the company (Size of the company)		
0-9 (Micro)	151	42.54
10-49 (Small)	90	25.35
50-249 (Medium-Sized)	51	14.37
250 and more (Large)	63	17.74
Dominant profile of activity		
Trade	92	25.91
Production	80	22.53
Services	183	51.56

The dominant group among the surveyed enterprises were those operating for over 20 years belonging to the micro-enterprise sector, i.e. enterprises employing up to 9 employees, as well as companies providing services (Table 1).

4. Results

The analysis of the research results showed that the average level of selected capability of employees influencing KI in all enterprises is 4.06 on a 5-point scale, and therefore it is relatively high. On the other hand, the average level of innovativeness of the surveyed enterprises is 3.27 on a 5-point Likert scale, which is quite surprising, because in this part of Europe the level of innovativeness of companies is generally low or very low (Community Innovation Survey 2021; Alegre et al. 2013).

Table 2: Descriptive statistics and correlations

	M	SD	I	KI_1	KI_2	KI_3	KI_4	KI_5	KL_6
I	3.27	0.958	1.000						
KI_1	4.06	0.940	0.313*	1.000					
KI_2	4.09	0.868	0.191*	0.464*	1.000				
KI_3	3.93	0.941	0.295*	0.496*	0.555*	1.000			
KI_4	4.12	0.873	0.242*	0.441*	0.434*	0.450*	1.000		
KI_5	4.17	0.837	0.208*	0.424*	0.405*	0.425*	0.625*	1.000	
KI_6	3.97	0.895	0.277*	0.430*	0.398*	0.439*	0.529*	0.573*	1.000

*Kendall's tau-b correlation ($p < 0.05$)

In the next stage of the study, it was checked if the general level of enterprise innovativeness was related to the selected capabilities as part of knowledge integration in an enterprises. For this purpose, the correlation analysis was conducted using the Kendall's tau-b coefficient. The conducted analysis showed that all the relationships between the company's KI operations and enterprise innovativeness were found statistically important since p is lower than 0.05 and were positively correlated with I (Table 2).

The multivariate linear regression analysis was conducted using the stepwise method, allowing for examining the significance of the subsequent variable introduced, as well as examining a different ordering of variables in each subsequent step (Montgomery, Peck & Vining 2012). The modeling results after introducing all the variables are shown in Table 3. Eventually, four variables remained in the model, namely KI_1, KI_3, KI_6, KI_2. The data model fitting was assessed with the R2 coefficient, which amounted to 0.2105, thus it can be indicated that four variables entered the model with $p < 0.05$, they explain it in 21.05%.

Table 3: Modelling result, final model

	b*	SD with b*	b	SD with b	T (348)	p
Intercept			1.442	0.257	5.61	0.000
KI_1	0.227	0.071	0.231	0.072	3.21	0.001
KI_3	0.265	0.076	0.270	0.077	3.49	0.001
KI_6	0.192	0.075	0.205	0.080	2.55	0.011
KI_2	-0.156	0.073	-0.172	0.081	-2.12	0.034
KI_5	-0.167	0.085	-0.191	0.097	-1.96	0.051
KI_4	0.114	0.085	0.125	0.094	1.34	0.182
Multiple R =0.4588; Multiple R ² =0.2105; Adjusted R ² =0.1970; F(6,348)= 15.466; p=9.76657576E-16; Standard error of estimation=0.858						

To sum up, one may indicate that the multivariate linear regression analysis using the stepwise method showed that four KI capability remained significant in the final model (Figure 1): employees in the company can apply their expertise to bring new initiatives to fruition; employees in the company can integrate and apply external knowledge to new projects, employees of the company interpret organizational principles in a similar way; employees in the company can integrate external knowledge with their existing knowledge. They explain little over 21.05% of the variance of I of enterprises.

5. Discussions

Research (Enberg, 2012) has shown that in a highly competitive environment, during conscious or unconscious communication between members of an organization, knowledge is transferred through e.g. knowledge integration. The exchange of information, as well as the use of skills and capabilities in an organizational perspective allow for integrating knowledge in order to gain market advantage. The capabilities of individual members of the organization that enable the integration of knowledge turn out to be crucial. The individual abilities of the members of the organization, and not the entire organization, may create favorable conditions for enterprises to integrate knowledge, which, in the conditions of a changing business environment, enables the organization to adapt to the prevailing conditions among competitors (Alexiev, Volberda, & Van den Bosch, 2016; Wang, Chen, & Fang, 2018). The research confirmed the previous study of Eldor (2020) which shows that the capabilities of organization members in the area of integration and use of external knowledge in projects increase the possibilities of knowledge integration. Moreover, the capability of the members of the organization to use professional knowledge in combination with external knowledge has a positive impact on the innovativeness of enterprises. The innovativeness of enterprises is perceived through the prism of development and the pace of introducing new products to the market. The dynamic capability of the organization members - as part of the knowledge integration and the use of external knowledge, which were identified during this research, are confirmed by some international studies (Chen, Damanpour, & Reilly, 2010; Zhao, & Wang, 2020). They emphasized, that the capability of members of the organization to integrate external knowledge with the existing knowledge, which was indicated in the study, is an important condition for shortening the process of introducing new products, and indicating an increase in innovation.

6. Conclusions and limitations

The presented research has allowed to indicate the abilities of the members of the organization influencing the integration of knowledge, which positively moderate the level of innovativeness of Polish enterprises (Figure 1).

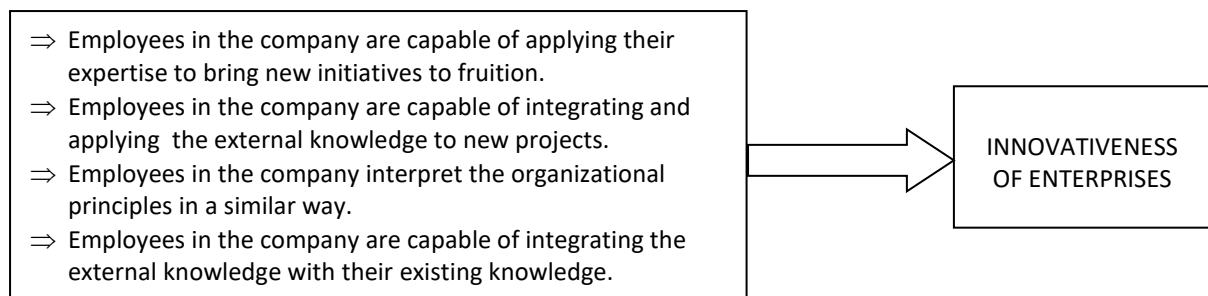


Figure 1: Organizational capability in terms of KI moderating the innovativeness of enterprises

In the case of Polish enterprises, it occurred that not all operations described as those integrating knowledge in the literature create a positive relationship with the innovation level. Furthermore, the identified capability KI describe only 21.5% of the model, thus it can be indicated that other capability may determine enterprise innovativeness. Nevertheless, the above research indicates the direction of the further research, which should focus on other variables moderating enterprise innovativeness.

The conducted research has some constraints. Firstly, they are due to the Covid-19 pandemic, which disrupted the process of entrepreneurship of enterprises and their operations in extremely turbulent and unpredictable conditions of management. Secondly, there is no research in individual sectors, in which the level of enterprise innovativeness varies significantly and is determined by different variables. However, the author is planning to extend the research and conduct it in the identified industries where enterprises wish to increase their innovativeness.

7. Theoretical and practical implications

The research offers several implications for practitioners. Recommendations in the area of activities for the integration of knowledge in enterprises that want to increase their innovativeness should focus on identifying and strengthening the capability of organization members - in certain areas. Managers should undertake initiatives aimed at identifying the abilities of employees implementing joint projects in order to achieve specific results that build the level of innovation in the enterprise. If companies want to increase the innovation of their products, they should strengthen the position of specialists in a given field by motivating and rewarding of own specialists. They should provide trainings in the identification of external information, and the use of external knowledge in the organization's projects.

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