BANKS' KNOWLEDGE-BASED INNOVATIVE CAPACITY – THE EMPIRICAL APPROACH

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Abstract. *The banking sector is known as a knowledge-intensive business. For years banks have used knowledge as a strategic resource for building competitive advantage. During the last decades, the development of new technologies and increasing competition from new market players such as FinTech companies have caused the need to develop their knowledge-based innovativeness. Thus the question arises of what builds banks' innovative capacity enabling them to support the implementation of innovations, which helps maintain their competitiveness. Based on an in-depth literature review, the banks' knowledge-based innovative capacity was defined as embedded in the bank's organizational culture, relationship with customers, and organizational characteristic ability to create, adapt and implement innovations helping to achieve banks' competitive performance. This multidimensional term was operationalized using 13 factors constituting the banks' organizational culture, banks' customers' knowledge management, and banks' structural features. The paper presents the exploratory research results conducted among banks operating in the Polish banking market. The contribution of particular factors to banks' knowledge-based innovative capacity was measured using the relative importance index (RII) and box plots constructed using positional data descriptive meters. The results show that the most important factors for building banks' knowledge-based innovative capacity contributing to competitive performance are organizational culture, cooperation with nonbank institutions (as FinTechs), and managing knowledge from and about customers. The research results have significant practical implications as they may help in the process of knowledge-based assets' application to the creation, implementation, and adoption of innovations. The results also develop the methodology to measure the banks' knowledge-based innovative capacity.*

Keywords: *innovative capacity, innovativeness, knowledge-based assets, banks' competitiveness, relative importance index*

Introduction

Dynamic changes in banks' environment influence established paradigms of their market behaviour and performance. Today knowledge-based innovative capacity resulting in innovativeness becomes a fundamental factor in creating value for banks and their customers. It enables banks to react flexibly to environmental changes or even create them. During the last decades, the increasing competition of new market players such as FinTech companies has caused the need to develop their knowledge-based innovativeness. Answering what builds banks' innovative capacity, which enables them to support the implementation of innovations and build their competitive advantage, should be of up-to-date and key importance. Thus, the paper aims to analyze what factors contribute to banks' knowledge-based innovative capacity, influence their innovativeness, and support their competitive performance.

Based on the in-depth literature review, the banks' knowledge-based innovative capacity is defined in this paper as embedded in the bank's organizational culture, relationship with customers, and organizational characteristic ability to create, adapt and implement innovations helping to achieve banks' competitive performance. It has three main dimensions – the bank's organizational culture, the bank's customer knowledge management, and the bank's structural features.

Most research on innovativeness and innovations is conducted in the industry sector. The studies analyzing entities operating in the banking market mostly focus on selected aspects of process innovations such as electronic distribution channels or product innovations (Eriksson et al., 2014; Norden et al., 2014; Akhisar et al., 2015; Mullan et al., 2017; Salampasis & Mention, 2018; Priya et al., 2018). None explored banks' knowledge-based innovative capacity as a foundation for building their innovativeness and competitiveness. As a result, the research in this field is original and fulfills this gap. The paper addresses what elements of banks' knowledge-based innovative capacity can support building their innovativeness. The analysis of previous research on innovativeness and innovations findings was also helpful for designing the tool (questionnaire) for measuring factors contributing to innovative capacity dimensions.

The paper presents the exploratory research results conducted among banks operating in Poland between 2018 and 2019. The data was retrieved from empirical research among commercial bank managers. It develops the theory and research in knowledge management and organizational innovation. To the best Authors' knowledge is one of the first attempts to empirically analyze factors contributing to banks' knowledge-based innovative capacity and innovativeness. The research results have significant practical implications, and they may help in the process of knowledge-based assets' application to the creation, implementation, and adoption of innovations. The results also develop the methodology to measure the banks' knowledge-based innovative capacity.

The term bank's knowledge-based capacity was operationalized using 13 factors constituting the banks' organizational culture, customer knowledge management, and structural features. The contribution of particular factors to banks' knowledge-based innovative capacity was measured using the relative importance index (RII) and box plots constructed using positional data descriptive meters. Multiple box plots allowed for assessing the average level, differentiation, and asymmetry of considered variables distributions.

The structure of the paper is as follows: the second section presents the literature review on banks' innovative capacity and innovativeness. It constitutes the foundations for defining terms used in the research and shows terms definitions, research questions, and hypotheses. It is followed by the research design section, including the methodology, variables description, and sample characteristics. Next, the results are presented. The paper concludes with a summary and the implications for theory, further research, and practice.

Literature review

Increasing competition forces banks to seek competencies that will enable the acquisition and effective use of knowledge-based resources and determine their competitiveness in the markets, which means an increase in their innovativeness and value (Klimontowicz, 2019).

Innovativeness is a multidimensional term. From a macroeconomic perspective, it refers to the economy, branches, or industries. From a microeconomic standpoint, it may be analyzed based on individual items such as companies (organizational innovativeness) or customers (customer innovativeness) as well as different fields and results of their activity (Table 1). It results from the innovative capacity, understood as an ability to act innovatively, and is a company's feature. It can also be perceived as a product or personality trait. Product innovativeness is a measure of its novelty (Schumpeter, 1960; Carneiro, 2007; Bowen et al., 2014), while in the case of a person, it is a derivative of creativity (de Jong & Den Hartog, 2007).

Table 1. The selected definitions of innovativeness (Source: Utterback, 1974; Subramanian & Nilakanta, 1996; Dobni, 2008; Dolińska,2010, p. 24; Kraśnicka & Ingram (ed.), 2014, pp. 17-18; Sankowska, 2009, pp. 95-97)

Autor	Definition
J. M. Utterback (1974)	A capacity to implement innovations earlier than most companies operating in a given industry.
A. Subramanian, S. Nilakanta (1996)	A constant organizational feature that enables an organization to keep innovative behavior sustainably over a long time.
E. Daneeeels, E. J. Kleinschmidt (2000)	An ability to introduce new products to the market, opening a new market through combinations of strategic orientation with innovative behaviors and processes.
A. Pomykalski (2001)	An ability to constantly search for, implement and disseminate innovations
W. Janasz, K. Kozioł (2007)	The willingness and ability to develop and absorb new or improved products, services or technologies.
C. B. Dobni (2010)	Willingness (propensity) to be innovative and the ability to introduce new products, services, or ideas and their implementation to improve business results.
M. Pichlak (2012)	The tendency to generate (adapt) innovation, the ability to create innovation, and the willingness to take risks related to implementing innovations.

The innovative capacity is created in the context of the strategy, organizational structure and culture, key competencies, including technical capabilities, relations with customers and suppliers, the existing competitive advantage (or lack thereof), and the identification (anticipation) of the changes in the international, national and local environment. Those factors can impact the organization's current and future competitiveness (Tidd et al., 2005; Dobni, 2008; Terziovski, 2010; Janasz, 2012). Today organizational knowledge distribution given by knowledge entropy and new technologies play a primary role here as they support the continuous learning process and organizational culture (Bratianu, 2019).

The innovative capacity is defined multi-dimensionally. First, it refers to the company's characteristics. It incorporates the willingness to develop the company's innovativeness, the infrastructure supporting creating and implementing innovations (creating conditions for developing employees' creativity, generating new ideas and solutions), and operating behaviors necessary to apply the market and value-creating orientation. According to Dobni (2008), innovative capacity includes strategic, product, and technological capacity. It results from structural features that characterize an organization as size, centralization, formalization and specialization, and resources (Subramanian & Nilakanta, 1996; Tidd et al., 2005). Centralization refers to the hierarchization and the employees' engagement in decision-making (Sciulli, 1998; Subramanian & Nilakanta, 1996; Schwartz, 2004; Liu et al., 2018), while formalization concerns competencies and responsibility for the performance of specific tasks. It includes the formal descriptions of duties, responsibilities, and employees' management policies and procedures (Sciulli, 1998; Subramanian & Nilakanta, 1996; Liu et al., 2018). Specialization determines whether highly specialized employees are in the organization's structures (Subramanian & Nilakanta, 1996). An innovative organizational culture is one of the organizational competencies enabling the creation of competitive advantage (Helfat et al., 2007; Klimontowicz, 2019). In contemporary banking, creating a competitive advantage requires cooperating with banking and non-banking competitors (FinTechs), referred to as coopetition. Such a capacity may be one of the most important determinants of a bank's innovativeness (Dapp, 2014; Walker, 2018). Coopetition has not been analyzed in previous studies, but the specificity of banking innovations causes the necessity to include it in this study. The innovative capacity is strictly connected with managing customer knowledge (Taherparvar et al., 2013; Taghizadeh et al., 2018), which consists of the knowledge about customers, the knowledge from customers, and the knowledge for customers (Garcia-Murillo & Annabi, 2002; Rowley, 2002; Gibbert et al., 2002; Gebert et al., 2003). The knowledge about customers includes the history of cooperation, transactions, knowledge of purchasing habits, motivations, and other information helpful in a better understanding of their needs (Smith & McKeen, 2005). The knowledge from customers relates to product, competition, and market evaluation. This knowledge helps better understand the bank's competitive environment (Garcia-Murillo & Annabi, 2002). It enables the improvement of innovation and development competitiveness by appropriately modifying existing products or introducing new ones. Social media and internet forums can be used to collect such knowledge, where customers share their opinions, problems, and doubts (Maswera et al., 2006). In turn, knowledge for clients includes everything that can help the client meet his knowledge needs, including finance and banking, for example, information about the products, all conditions, and possible risks associated with using these products. Providing knowledge to clients influences the perception of service quality (Gebert et al., 2003). It is delivered through various types of materials, leaflets

or applications and is aimed at helping to make better financial decisions (Lopez-Nicolas & Molina-Castillo, 2008).

Based on the above literature review, in this paper, *banks' knowledge-based innovative capacity* is defined as embedded in the bank's organizational culture, customer relationship, and organizational characteristic ability to create, adapt and implement innovations. Such a capacity does not equal innovativeness. It shows a potential that may be used or not. However, having it enables a bank to decide about a kind, a number, a place, and a time of innovations' implementations. Thus the innovative capacity may be or not be converted into innovativeness. Consequently, the *banks' innovativeness* is the result of the ability to use the bank's innovative capacity reflected by the implementation of innovations that are appropriate by the type, number, place, and time to provide value for banks and their customers, and thus enable the bank achieving a competitive position in the market. A bank's innovative capacity includes organizational culture, the ability to manage customer relations, and structural features (Table 2).

Table 2. The dimension and elements (variables) of the bank's innovative capacity

Dimension	Variables	Source
Bank's Organisational Culture	Decisions' centralization	Subramanian & Nilakanta, 1996; Nobel & Birkinshaw, 1998 Dobni, 2008; Liu et al., 2018
	Formalisation of processes and decisions	
	Employees' specialization	
	An organizational culture focused on innovations	
	The ability to cooperate with banking competitors	
	The ability to cooperate with non-banking competitors as, e.g. FinTechs	
Bank Customers' Knowledge Management	Managing knowledge about customers	Dobni, 2008; Taherparvar, et al., 2013; Smet, et al., 2013
	Gathering and managing knowledge from customers	
	Delivering knowledge for customers	
Bank's Structural Features	Size.	Subramanian & Nilakanta, 1996; Nobel & Birkinshaw, 1998; Liu et al., 2018
	The time of operating activity in the banking market.	
	Strategic market position	
	IT and products' development budget	

Methodology

With the intention to fulfill the research gap, the paper addresses the question of what elements of banks' knowledge-based innovative capacity can support building their innovativeness.

Achieving the main purpose required realizing the following specific objectives (SO):
- operationalization of research constructs (SO1),
- designing a methodology for measuring the bank's innovative capacity (SO2),

- measuring the dimensions of constructs and assessing the scales' reliability and accuracy (SO3),
- assessing the importance of specific banks' innovative capacity factors for banks' innovativeness (SO4).

The main research hypothesis (H) is that, from the perspective of innovativeness and competitiveness, the most important factors relate to banks' organizational culture and customer relationships.

Bank's innovativeness is a complex and multidimensional feature that is unobservable. Measuring such conceptual categories (latent concepts) requires determining a set of variables describing them. Based on the literature review, 13 variables (elements of banks' innovative capacity) were chosen to operationalize the concept (Table 2). Constructing this type of scale involves checking the extent to which individual statements or questions, called scale items, relate to a specific, single latent concept (e.g. organizational culture of banks, customer knowledge management, or the characteristics of banks). Using scales to measure innovative capacity and innovativeness is associated with the risk resulting from the subjectivity of individual assessments. Still, it is a common practice used in empirical research of this type (Khazanchi, Lewis & Boyer, 2007) due to companies' reluctance to disclose all data (Boyer et al., 1997; Ward & Duray, 2000). Senior managers are assumed to know these data and can reliably and accurately assess the variables using the scales (Choi & Eboch, 1998). In addition, using quantitative data can make it difficult to compare the results between organizations due to differences in how they are aggregated and converted (Dess & Robinson, 1984; Porter, 1979). Considering the above arguments, banks' managers and experts were the target group in this research, and measurement scales were used to measure banks' innovativeness. Responders were asked to assess the influence of specified variables on the level of a bank's innovativeness using a 7-point scale where one meant a definitely negative and seven significantly positive influence on a bank's innovativeness.

The scales used in the questionnaire adopted the scales used in the research conducted in the service sector, including banking (Subramanian & Nilakanta, 1996; Wang & Ahmed, 2004; Dobni, 2008; Liu et al., 2018; Anning-Dorson, 2018). In previous studies, the accuracy of the scales (understood as the relationship of the measurement tool with the theoretical construct - the latent variable that the scale is to measure) was confirmed with the use of confirmatory factor analysis (Wang & Ahmed, 2004; Dobni, 2008; Vicente, Abrantes & Teixeira., 2015). Scales used in the questionnaire were assessed using Cronbach's α, which measures the scale's internal consistency (Cronbach, 1991). It is assumed that in exploratory studies which explore a given phenomenon, such as banks' innovative capacity, the ratio should exceed 0.6 (Nunally & Bernstein, 1994). Similarly to previous surveys, in this research, all scales reached the minimum value, significantly exceeding this level. (Table 3). It proved the validity and reliability of questionnaires. Thus the research data allowed verifier factors constituting the bank's innovative capacity.

Table 3. The analysis of scales' reliability

Dimension	α-Cronbach
Bank's Organisational Culture (BOC)	0,7153
Bank Customers' Knowledge Management (CKM)	0,8189
Bank's Structural Features (BSF)	0,7271

The relative importance index (RII) was used to determine the relative ranking of the factors determining banks' innovative capacity. The composition of the index is as follows:

$$RII = \text{sum of weights } (W1 + W2 + W3 + \ldots\ldots + Wn\ ) \ / \ A \times N$$

where: W = weights given to each factor by the respondents (from 1 to 7 where '1' is less significant and '7' is extremely significant); A = highest weight (i.e. 7 in this case; N = total number of respondents). Additionally, box plots were constructed on the basis of positional data descriptive meters. They allow for assessing the average level, differentiation, and asymmetry of the considered variables' distributions. The calculations were made using the R software.

The data was retrieved from empirical research conducted between 2018 and 2019 among commercial bank managers. The general research sample consists of 61 commercial banks. The sample size caused that, in the first step of the research, all of them were invited by the Polish Bank Association to participate in the survey as all were members of the association. In the second step, a procedure similar to random sampling was applied. Such a sampling procedure was used in research on the banking market (Salampagis & Mention, 2018). Finally, the research sample comprised 16 banks (26% of the general sample). The banks represent 77% of total banking sector assets. Altogether 71 managers and experts responded to the questionnaire.

Results and discussion

Based on the literature review, *banks' knowledge-based innovative capacity* was defined as embedded in the bank's organizational culture, customer relationship, and organizational characteristic ability to create, adapt and implement innovations. The 13 variables constituting those dimensions were assessed by banks' managers and experts based on their influence on banks' innovativeness.

According to respondents, the key ones are an organizational culture focused on innovativeness (RII=0,88) and the ability to cooperate with the nonbank institution (RII-0,87). They were also consistent that those factors are innovativeness drivers. Half of them assessed that those factors influence banks' innovativeness positively. The next drivers were gathering and using knowledge from customers (RII=0,82) and managing knowledge about customers (RII=0,82). Again half respondents agreed on the positive influence of those determinants. The distribution of answers showed that 25 percent of respondents (upper quartile) considered them as factors of significant importance, and 25 percent of respondents (lower quartile) considered them as influencing banks'

innovativeness slightly. Figures 1 and 2 present the RII values for all variables and distributions of answers accordingly.

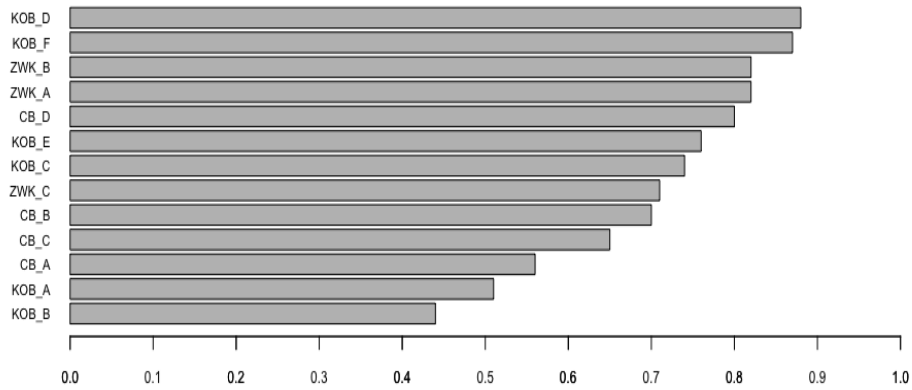

Figure 1. The RII value of banks' innovative capacity variables

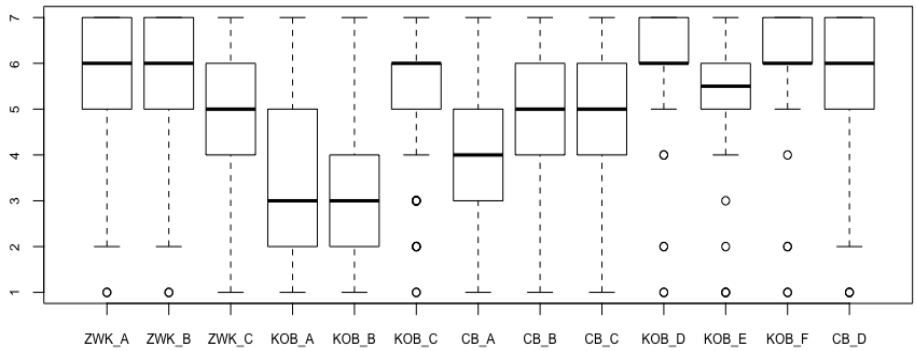

Figure 2. The distributions of answers

Legend for figures 1 and 2:

Bank's Organisational Culture:

KOB_A	Decisions' centralisation
KOB_B	Formalisation of processes and decisions
KOB_C	Employees' specialisation
KOB_D	An organisational culture focused on innovations
KOB_E	The ability to cooperate with banking competitors
KOB_F	The ability to cooperate with non-banking competitors as, e.g. FinTechs

Bank Customers' Knowledge Management:

ZWK_A	Managing knowledge about customers
ZWK_B	Gathering and managing knowledge from customers
ZWK_C	Delivering knowledge for customers

Bank's Structural Features:

CB_A	The time of operating activity in the banking market
CB_B	Strategic market position
CB_C	Size
CB_D	IT and products' development budget

Among the factors assessed above the average importance (amounted to 0,70) also are:
- the budget for IT and new products development (RII=0,80),
- the ability to cooperate with competitors – coopetition (RII=0,76),

- specialisation (RII=0,74),
- delivering knowledge to customers (RII=0,71).

The same distribution of answers relates to the budget for IT and new products' development and managing knowledge about customers. Among other factors, the average assessment of specialization was graded at the highest level (at least 75 percent of respondents pointed out 6 or 7). The centralization and formalization achieved the lowest grades (at least 25 percent of respondents pointed out 2 maximally). Half of the respondents assessed the influence of the ability to cooperate with competitors (coopetition) and specialization as positive or slightly positive choosing 5 or 6. They were not so consistent in the case of delivering knowledge to customers.

The next group of factors includes the bank's features as market position (RII=0,70), bank size (RII=0,65), and the length of the bank's market activity (RII=0,56). Respondents did not agree with assessing those factors. The distribution of answers for the bank's size was symmetric. The distribution of responses was equal for the market position and the bank's market activity length. At least half of the respondents granted them at least 4. It means that some respondents assess them as slightly positive, but according to others, they do not influence banks' innovativeness or even influence it negatively. The formalization and centralization obtained the lowest RII value. At least 75 percent of respondents thought formalization negatively influences banks' innovativeness. However, they did not agree on the case of centralization.

Summarising the assessment of factors influencing banks' innovative capacity, it is worth indicating which of them are drivers for and barriers to developing such a capacity. According to responders, the first group consists of an organizational culture focused on innovativeness, the ability to cooperate with nonbank institutions, especially FinTech companies, the ability to gather and use customer knowledge about customers, specialization, and the ability to collaborate with competitors (coopetition). The centralization and formalization were considered barriers to banks' innovativeness development. In the case of other factors, respondents presented different opinions. It is worth mentioning that most drivers are factors that constitute organizational culture.

Conclusions

Banks' innovativeness is a relatively new field of research that requires designing the scientific framework for further research. This study attempts to prepare a foundation based on previous research and theory in organizational innovations, knowledge management, and resource-based competitiveness.

The paper aimed to find internal factors influencing banks' innovativeness. Defining *banks' innovative capacity* and *innovativeness* allowed us to operationalize those multidimensional terms (objective SO1) and design research methodology (objective SO2). The data gathered during the field research enabled us to measure of the dimensions of constructs and assess the scales' reliability and accuracy (objective SO3) and the importance of specific banks' innovative capacity factors for banks' innovativeness and competitiveness (objective SO4). As a result of achieving specific objectives, the general purpose, specifying elements of banks' knowledge-based innovative capacity that can support building their innovativeness and competitiveness, was achieved.

The results show that among banks' innovative capacity drivers are an organizational culture focused on innovations, the ability to cooperate with non-banking institutions, the ability to manage knowledge about and from customers, employees' specialization, and the ability to cooperate with competitors. The highest value of the relative importance index (RII) of banks' organizational culture focused on innovations and managing knowledge from and about customers helped positively verify the research hypothesis. It is worth mentioning that coopetition as a factor not analyzed in the previous research was also pointed out in the group of highly assessed factors. On the contrary, innovative capacity is negatively influenced by the centralization and formalization of decisions and processes. Taking into account the rest of the elements, responders' opinions differed.

The research results have significant practical implications as they may help in the process of knowledge-based assets' application to the creation, implementation, and adoption of innovations. The results also develop the methodology to measure the banks' knowledge-based innovative capacity.

The limitation of the research results from the methodology. Even if it is commonly applied in such studies and there are positive substantive arguments in the literature to use it, there are still some risks connected with the possible subjectivity of individual assessments.

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