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Methodological Aspects of Measuring the Innovation Maturity of Enterprises - Proposal of the Author's Own Innovation Maturity Model

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Abstract:

Purpose: *The purpose of this paper is to present ways of measuring the innovation maturity of enterprises from the point of view of innovation maturity models, and to present the author's own model that enterprises could use on their own.*
Design/Methodology/Approach: *The first part of the article presents a short summary of literature studies on existing innovation maturity models. In the second part, the author presents her own innovation maturity model and the results of the research that was conducted in IT enterprises located in the Lubusz Voivodeship in Poland.*
Findings: *The proposed innovation maturity model works well as a tool for self-assessment of enterprises, but unfortunately, it has some flaws as well. Firstly, due to the fact that the research was conducted only on a sample of IT enterprises, its applicability to other industries has not yet been determined, and additionally, the measurement of the innovation maturity model carried out in the form of self-assessment may be unreliable if it is not carried out in a reliable and objective manner.*
Practical Implications: *The innovation maturity model proposed in the research can be successfully used by enterprises to measure their level of maturity; additionally, the proposed innovation maturity matrix gives directions to entrepreneurs in which areas they should make changes in order to move to a higher level of innovation maturity. It is therefore not only a tool for identifying changes in the level of innovation maturity, as some of the existing models, but also a tool containing certain recommendations for business practice allowing to increase the level of innovative capabilities and, consequently, the level of innovation maturity.*
Originality/Value: *The paper presents a new tool for measuring the innovation maturity of enterprises. The tool is easy to use and, unlike many existing models, it indicates in which areas the company should make changes in order to develop its innovation maturity.*

Keywords: *Innovation maturity model, innovation maturity matrix, innovation.*

JEL codes: *O10, O32.*

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1. Introduction

In recent years, the idea of innovation has gained immense popularity, as evidenced by the thousands of results obtained when typing the keyword "innovation" into Internet search engines. This should not surprise anyone, as in a changing environment, it is often innovations that determine the survival of an organization. It is worth emphasizing that many enterprises indeed recognize the importance of innovation for their survival and development, or the possibility of gaining a competitive advantage, as confirmed by the results presented in the latest Boston Consulting Group (2024) report on innovation.

Interestingly, the authors of the research indicate that as many as 83% of respondents participating in the survey indicated that innovations are one of their top three priorities. As Gierszewska and Huras (2022) point out, innovations are crucial for the development of organizations as they are responsible for half of their growth.

Despite the fact that enterprises consider innovation important, Achi *et al.* (2016) note that many of them have significant difficulties in defining and implementing the right innovation strategy. Many companies use improper approaches and are immature in terms of innovation practices.

To address these problems, companies are increasingly turning towards assessing their innovation process and identifying key actions to improve their innovativeness, as well as taking steps to enhance their innovation capability.

The ability to appropriately utilize the resources possessed by an enterprise, including innovation capability, is defined as innovation maturity (Corsic and Neau 2015; Zaleśna 2013). As Spoz notes, innovation maturity is a situation where a company is aware of the importance of innovation in achieving market success. Therefore, innovation is treated as a permanent element not only of the company's operations but also of its development (Spoz, 2019).

Innovation maturity of an organization can also be viewed through the lens of its dynamic innovation capabilities, because a higher innovation capability within the organization leads to an increase in the number of innovative solutions created, which in turn translates into an increase in the level of innovation maturity of the organization (Stawasz 2014; Inków 2019).

A tool used to measure the level of innovation maturity of enterprises is innovation maturity models, which allow to assess an organization both in terms of its degree of organizational maturity and by indicating areas where changes should be made so that the organization can move to a higher level of innovation maturity. It is worth mentioning that innovation maturity models are gaining popularity nowadays.

However, despite the growing interest in them and the undeniable benefits associated with their use, they are not without weaknesses, therefore the aim of this research is to present the methodological aspects of measuring the innovation maturity of enterprises and to present the author's own innovation maturity model, along with the results of the conducted research.

2. Literature Review on Innovation Maturity Models

In management literature, various proposals for innovation maturity models can be found, e.g., PRTM Innovation Maturity Model (PRTM, 2007), Innovation Capability Maturity Model (Essmann, 2009), IM2-Innovation Maturity Model (Think for a Change, 2009), INPAQT Innovation Capability Maturity Model (INPAQT, 2010), Business Innovation Maturity Model (BIMM), (Praveen Grupta Accelper Consulting, 2010), People innovation capability maturity model (Funchall *et al.*, 2011), I²MM – Integrated Innovation Maturity Model (Müller-Prothmann and Stein, 2011), Maturity model for innovation management (Zaleśna, 2013), Supply Chain Innovation Maturity Model (Mudholkar, 2014), Innovation Capability Maturity Model (Corsi and Neau, 2015), Startup Ecosystem maturity model (Cukier *et al.*, 2016), Responsible Research and Innovation (RRI) (Stahl *et al.*, 2017), Strategic Management Maturity Model for Continuous Innovation (Demir, 2018), Firm-level Innovation Capability Maturity Model (Arends, 2018), Innovation-to-Impact benchmark tool - i2i by BCG, (BCG, 2024), innovation maturity index (PARP, 2023).

The analysis of innovation maturity models reveals that their characteristic feature is a hierarchical and sequential structure. In each of the models their authors identified several levels that determine the innovation maturity of the examined organization. It is worth adding that the analyzed innovation maturity models, like other organizational maturity models, constitute a multi-criteria assessment of a maturity level. As such, they should precisely indicate areas where the company needs to make changes to achieve a higher level of innovation maturity in the future.

Innovation maturity models are most often the models distinguishing five levels of innovation maturity, only a few of them distinguish three levels (e.g., Mudholkar, 2014) or six levels of innovation maturity (Demir, 2018).

However, regardless of the number of distinguished innovation maturity levels, a common feature among all models is that the first, the lowest level is characterized by a lack of innovation maturity, while the highest level indicates that the company has achieved full innovation maturity and can be considered a leader in innovation.

It is also worth emphasizing that the authors quite consistently define enterprises that have achieved the lowest and highest levels of innovation maturity. An enterprise that has reached the first level is a non-innovative enterprise. Such enterprises do not engage in innovation activities nor make any effort to increase their level of

innovation, innovation activities occur rather rarely and are chaotic and unplanned (Think for a Change, 2009; Demir, 2018; Bassiti 2018; Stahl *et al.*, 2017). Achieving the highest level by an enterprise means that innovations have become part of its organizational routine, and the enterprise itself has chosen the path of continuous progress (Demir, 2018; Gartner Group).

Despite certain common features, it is worth noting that innovation maturity models differ in the way they determine the maturity level of a company, each model presents a different set of analysis areas and metrics used within them. Additionally, while the implementation of maturity models, including innovation maturity models, offers many benefits for organizations, these models are not without limitations.

The main limitations stem from the fact that existing models, especially those created by consulting firms, are designed to be universal models applicable across various industries, and while the intention of creating a universal model is understandable, it turns out to be extremely difficult to select an appropriate set of measures that would allow for the correct assessment of the innovation maturity level of companies from different industries. Another limitation of existing models, or at least some of them (e.g., Essmann, du Preez 2009; Think for a Change, 2009; Bassiti 2018), is that they only determine the innovation maturity level of a company, but do not indicate what improvements and in which areas the company should make in order to move to a higher maturity level.

These models specify only general requirements for companies, moreover, often these requirements are specific to a particular company, and therefore they cannot be applied even to other companies within the same industry. In this approach, models are only a tool for controlling changes taking place in the level of innovation maturity achieved, indicating only what innovation capability is, and not how to achieve it.

Moreover, it is also worth emphasizing that some of the analyzed models concern only specific industries, or even only the leader in a given industry (Raffai and Szikszai 2015; Stahl *et al.*, 2017), what causes that these models cannot be used for measuring the innovation maturity of other enterprises apart from the leader, or enterprises from other industries. The weaknesses of existing innovation maturity models inspired the author to create her own model. The author's goal was to create a model without the limitations of existing models.

3. The Proposed Model of Innovation Maturity

As the author mentioned earlier, the limitations of existing innovation maturity models inspired her to create her own model. Therefore, the main goal of the proposed model is to determine the level of innovation maturity of enterprises, but also to create a tool that indicates the direction and scope of further improvement for enterprises, allowing them to increase their level of innovation maturity.

Determining the level of innovation maturity of the company itself is important because it allows it to assess its ability to compete on the market. However, it is equally, if not more, important to determine the areas in which changes should be made so that the company can achieve a higher level of innovation maturity.

As Wendler (2012) notes, a well-constructed maturity model includes a set of clearly defined stages or levels that describe the development of the examined enterprise in a straightforward manner. The designated stages should be sequential and present a hierarchical progression. Moreover, they should be closely linked to structures, activities, stages, or levels used to measure the completeness of the analyzed objects using various sets of multidimensional criteria.

After analyzing the identified innovation maturity models, it can be noticed that most often the models created by consulting companies are original, new models created by these companies for the needs of their clients, while the remaining models are generally models based on other already existing models, for example Capability Maturity Model, or its newer version Capability Maturity Model Integration (Essmann 2009), but there are also some models that draw from a wealth of other models, attempting to somehow combine them into a whole. It should be mentioned, however, that while maturity levels are often common in such models, the areas of analysis are not.

In creating her model, the author also decided to use already existing models, with appropriate modifications. Therefore, the number of maturity levels was adopted from Capability Maturity Model Integration. The proposed maturity model will be based on five levels of innovation maturity:
level 1 - lack of innovation, level 2 - forced innovations, level 3 - planned innovations, level 4 - innovation management, level 5 - continuous improvement of innovation management. Short characteristics of enterprises that have achieved specific levels of innovation maturity are presented in Table 1.

Table 1. *Short characteristics of individual levels of innovation maturity according to the proposed model*

Innovation maturity level	Short characteristics of an enterprise
Level 1 - lack of innovation	An enterprise is characterized by the lack of any innovation activity, the lack of both innovative thinking and the lack of recognizing the need to conduct innovation activities.
Level 2 - forced innovations	An enterprise that has been assigned to this level of maturity conducts innovation activities to a small extent, but it does not do it on its own initiative, in a planned way, but in response to changes taking place in its environment.
Level 3 - planned innovations	An enterprise that has achieved this level begins to notice the importance of innovation activities, additionally, it sees its employees and customers as a potential source of innovation, and the innovation activity itself begins to take a more systematic form.

Level 4 - innovation management	An enterprise characterized by innovation maturity at this level not only recognizes the importance of innovation activities for the company and conducts these activities in a planned manner but also undertakes the implementation of innovation projects. This includes utilizing resources from external entities it collaborates with, such as R&D institutions.
Level 5 - continuous improvement of innovation management	An enterprise at this level can be described as an experienced innovator or innovation leader. Such a company has an innovation strategy and continually takes actions to improve the processes of developing and implementing innovations.

Source: *Inków, 2023.*

Due to the fact that the areas most frequently mentioned in the literature affecting the possibility of developing the innovation capabilities of enterprises are: organizational strategy (Saunila and Ukko, 2014; Blommerde and Lynch, 2016; Lambrou, 2016), knowledge management (Nieves, 2016; Blommerde and Lynch, 2016; Ullah *et al.*, 2017), organizational culture (KPMG, 2014; Saunila and Ukko, 2014; Lambou, 2016), customer involvement (Rapaccini *et al.*, 2013; Blommerde and Lynch, 2016), and the scope of innovation activities (KPMG, 2014, Wang and Ahmed, 2004; Lambrou, 2016), the author adopted these areas of analysis when creating her own innovation maturity model. For each area, she proposed its characteristics in relation to each level of innovation maturity, thus creating an innovation maturity matrix (Table 2).

Table 2. *Innovation maturity matrix*

Innovation maturity level analysis area	Level 1. Lack of innovation	Level 2. Forced innovations	Level 3. Planned innovations	Level 4. Innovation management	Level 5. Continuous improvement of innovation management
Enterprise strategy	No formal strategy, no innovation strategy. An enterprise focused on operational planning	An enterprise has a defined strategy, but it has an informal character.	An enterprise has a clear and accepted strategy, precisely defined goals, and innovation activities begin to be adapted to the requirements resulting from the enterprise's goals.	An enterprise has a formally written strategy that serves as a reference point for decisions and actions. There is also a formally written innovation strategy. Innovation is treated as a very important component of the enterprise's strategy	An enterprise's strategy and innovativeness result from a comprehensive view of the enterprise. Strategic planning is constantly improved and the results obtained are monitored in comparison to the strategic goals.
Knowledge management	Lack of attention to	Knowledge management, if	There is an organized	Knowledge management	Knowledge management is

	knowledge management processes in the enterprise, limited information flow and inability to handle information from external sources.	it exists, is disordered, and employees are still little aware of knowledge management processes.	knowledge management architecture within an enterprise that facilitates horizontal and vertical communication. We cannot yet talk about cooperation at the group level.	processes have an established position within an enterprise, they are perceived as important, take place at the group level, changing the collective understanding of the group, and group thinking is promoted .	constantly improved and strongly integrated with an enterprise. There is a high level of understanding of knowledge management practices within the enterprise and its employees are willing to learn. The emphasis is placed on developing a learning culture.
Organizational culture	An enterprise does not see the need to build a culture supporting innovation. Lack of any support for innovation initiatives.	There is no formal system of incentives and rewards designed to promote and support innovation ideas within an enterprise. Activities related to the development of innovations are not the initiative of employees, but result from delegating tasks to them by its management.	An enterprise perceives employees as a source of knowledge and innovation, and a system of incentives is created to promote innovation initiatives among employees. However, this system is not always formally developed, clear and understandable to everyone.	An enterprise has a formally defined, clear and understandable system of incentives and rewards for innovation to all employees. The organization invests in employees, providing them with development opportunities.	The system of incentives and rewards for innovation existing in an enterprise is constantly modified and improved in such a way as to maximally motivate employees to undertake innovation activities.
Customer involvement	Customers are seen only as passive buyers of products and services.	Customers become involved in work on innovations through research on buyers preferences carried out to a small extent.	Customers are treated as an important source of innovation and are involved in cooperation at each stage of innovation development.	Customers actively cooperate with an enterprise in creating innovations, at each stage, both at the early idea stage and at the testing stage.	Customers are treated as an essential component of the process of developing and implementing innovations, and they are often also treated as business

					partners.
Scale of innovation activities	An enterprise does not undertake any innovation activities.	The innovations that emerge at this level were not previously planned. The changing environment and customer requirements force the organization to develop innovations.	An enterprise recognizes the importance of innovation for the success of its operations, therefore it begins to conduct innovation activities in a more systematic way. The first innovation projects appear.	The enterprise's innovation activity has a specific direction resulting from the innovation strategy, and is systematized and planned. Innovation projects are being developed.	Innovation activity is the most important component for an enterprise and has a special place in its strategy. The organization is focused on continuous improvement of innovation processes.

Source: *Inków, 2023.*

The presented innovation maturity matrix synthetically outlines what an enterprise should do to move to a higher level of innovation maturity, which should significantly facilitate the application potential of the proposed model in the future. Detailed characteristics of each analysis area for every maturity level have also been developed.

However, due to the brevity of this paper, they will be presented in future publications. Regarding the method of classifying enterprises into specific levels of innovation maturity, the presented model assumes a point-based multi-criteria assessment of innovation maturity, therefore enterprises are assigned to specific levels based on the number of points obtained during the research.

The author of the model envisions that in the future companies will be able to use the model as a self-assessment tool, which is why a standardized questionnaire was created, consisting of eleven questions. Each question contains between 1 to 16 statements, which respondents rate on a scale from 1 to 5.

Questions 1 to 5 concern the innovation activity of the examined enterprise, the sixth question concerns whether the company develops its own innovative ideas or relies on the achievements of other companies. The seventh question concerns the company's strategy and the place of innovation in that strategy. The eighth question relates to knowledge management, and the ninth addresses organizational culture. Questions 10 and 11 pertain to interactions with potential users of the created solutions, from concept to implementation. For each assessed statement, the company receives between 1 and 5 points. The total number of points to be obtained is 320. Companies that score no more than 160 points are classified at the first level. Those scoring between 161 and 208 points are at the second level.

Achieving between 209 and 240 points classifies a company at the third level, while 241 to 288 points place it at the fourth level. Companies scoring between 289 and

320 points are considered innovatively mature enterprises, having reached the highest fifth level of innovation maturity. The point ranges were developed based on existing maturity models, namely the Innovation Capability Maturity Model (Corsi and Neau, 2015) and the Free Innovation Audit model (Human-Centered Change and Innovation Innovation).

4. Description and Research Results

The presented study was conducted among IT companies in the Lubusz Voivodeship in Poland, chosen because the IT and ICT sectors are rapidly developing in this region, making the results potentially interesting. While conducting the study, the author used the individual interview method with a standardized questionnaire, which had been previously discussed. In the second stage, the study was supplemented with a survey interview.

Seventy representatives of management or owners representing 70 companies participated in the study, including 51 micro-enterprises, 14 small enterprises, 2 medium-sized enterprises, and 3 large enterprises. It is important to note that the seemingly incorrect structure of the surveyed companies is actually appropriate and reflects the significant fragmentation of the IT sector, not only in the Lubusz Voivodeship but also throughout Poland.

After calculating the points obtained by the enterprises participating in the study, it turned out that most respondents were indeed companies with low innovation maturity. Twenty-four companies were assigned to the first level of innovation maturity, as 24 enterprises were assigned to the first level of innovation maturity and 22 of them to the second level. Five companies reached the third level, while only three companies achieved full innovation maturity, i.e., the fifth level.

However, it is encouraging that sixteen companies reached the fourth level of innovation maturity, with three of them being very close to achieving the fifth level, needing only 1 to 3 points, and four others needing 10 points to reach the fifth level. The vast majority of non-innovative companies were micro-enterprises (41), while most of the companies that achieved the fourth and fifth levels of innovation maturity were small enterprises, with eight and two respectively.

The most innovative companies are those that have been operating on the market for over 10 years, focusing on software creation and sales, as well as IT consulting. However, the least innovative companies were most often involved in selling computer hardware and software

Unfortunately, the obtained results are not surprising but merely confirm the relatively low innovativeness of the surveyed companies, which is consistent with studies on innovation conducted by the Boston Consulting Group (BCG) and the Polish Agency for Enterprise Development (PARP).

The enterprise innovation survey conducted by BCG (2024), shows that as many as 83% of respondents believe that innovation is important and consider it one of the three priority areas of interest, but only 3% of the surveyed companies are ready to implement innovations, meaning that only 3% of respondents have achieved one of the highest levels of innovation maturity.

Similarly, a study conducted on a sample of Polish companies by PARP (2023) shows that only 13.2% of respondents are innovative companies. More worryingly, 8 out of 10 respondents in that study declared no plans for conducting innovation activities in 2022. Thus, it can be observed that the results obtained from broader studies on the innovation maturity of companies align with the results obtained by the author.

5. Conclusions

Innovation maturity is not a new problem, but it remains a "hot" topic (Gierszewska and Huras, 2022). Research conducted worldwide and in Poland by various entities clearly shows that the vast majority of surveyed entities lack innovation maturity, with only a few considered innovative and highly innovative.

Many researchers note that innovation maturity models could support enterprises' efforts to improve their innovativeness. These models can serve as effective tools for self-assessment of their innovation maturity level and for identifying areas where deficiencies exist within the organization, improvements in which will allow it to move to a higher level of innovation maturity. This also inspired the author to create and present her own innovation maturity model that would be a simple and transparent tool for measuring innovation maturity levels, which any enterprise could use to both measure their maturity level and identify areas with deficiencies that, if addressed, could elevate the enterprise to a higher level of innovation maturity.

However, it should be added that the author's use of this model only to measure the innovation maturity of IT companies may raise concerns about its applicability to other industries at this moment. Therefore, the author plans to conduct future studies on the innovation maturity of enterprises from other industries using the model presented in this research paper.

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