Knowledge Bases Created for Discovering Business Opportunities: Empirical Results from Polish Enterprises*

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Abstract

Purpose - Business knowledge bases are created for the purpose of preparing decisions at different levels of management: strategic, tactical and operational. The key area of interest in this article are strategic knowledge bases created for the discovery and creation of business opportunities (opportunities are a specific conjunction of chances, company potential and business goals). An important research goal in this article is to search for the answer to the question: whether and to what extent companies create such bases, and how they use them.

Methodology/approach -These questions are a part of a wider research project on Industry 4.0 and business opportunity theory, conducted at the Faculty of Engineering Management, Poznan University of Technology. The 2024-25 survey was conducted in Poland, covering 300 industrial enterprises in 19 industries, including 60 large enterprises and 240 medium-sized enterprises. The respondents were board members and managing directors of companies and were invited to respond on a 1–5 (Likert) scale. Furthermore, the data was partially processed using the Spearman's rank correlation test (Statistica 13.3).

Findings - The results of the survey indicated that there is a correlation between increased availability of data and information and contribute to accelerating entry into new sectors, new domestic markets and new foreign markets.

Keywords: knowledge management, knowledge base, opportunity, opportunity discovery, opportunity management

Introduction

The postulated knowledge base structure for opportunity discovery and creation includes: Macro-environment (economic, political and legal, social and demographic, technological, international), Microenvironment (competitive rivalry in the sector, bargaining power of customers in the sector, bargaining power of suppliers in the sector, treats of new entrants into the the sector, threat of substitute products or services), Company's Potential (assets, liabilities, human resources, knowledge, methods and techniques of management). The most important areas of interest in this article are the strategic knowledge bases that are used to find and create

business opportunities. Opportunities are defined as specific combinations of chances, company potential and business goals. Chances appear in the environment and are active for a certain period of time, regardless of whether they are exploited by the company. To take advantage of a chance, resources with the right potential (qualitative and quantitative structure) are needed. Identification of opportunities is done by assessing the possibility and sensibility of combining the chance and potential from the point of view of the company's business goals. In order to capitalise on emerging opportunities, it is essential to have the appropriate resources at your disposal, including both qualitative and quantitative assets. Finding opportunities means working out how likely it is and how good it would be for the company to take a chance, based on what the company wants to achieve. A knowledge-based or learning-based perspective alone does not sufficiently explain opportunity recognition. While knowledge provides a foundation, learning can assist entrepreneurs in novel contexts. The interactions between the two add complexity to the analysis of opportunity recognition. Although many contexts require a combination of knowledge and learning, research in this area remains scarce (Simon Ohlert, Simon et al. 2025). This paper is a part of a wider research project on Industry 4.0 and business opportunity theory.

Research problem

Chances in the environment

Analysing scientific research into the identification and exploitation of market opportunities, It has been demonstrated that companies in a variety of sectors are able to identify environmental market opportunities by combining systematic market research, rigorous environmental assessments, and active stakeholder engagement (Albino, Vito et al. 2012), (Chandra, Yanto et al., 2009). A review of the literature indicates that big data analysis helps companies identify emerging market opportunities (Nemati, Khajeheian, 2018), (Maroufkhani at all, 2020), (Liu at all, 2020), (Shrivastava, Riaz, 2022).

Company potential

The "triple bottom line" concept, developed by J. Elkington (Elkington, 1997), defines three key elements of a modern successful enterprise: economic goals and the maximisation of profit to enable growth and survival, human resource orientation and corporate social responsibility, and environmental goals. Economic goals in the various phases of industrial enterprise development were achieved by changing operational paradigms.

Business Goals

As the literature on strategic analysis and strategic choices shows, there is a broad discussion of the interaction between the enterprise and its environment. This discussion includes the selection of enterprise strategy depending on the enterprise environment's conditions. (Stonenhouse 2001), (Bieńkowska and A. Zgrzywa-Ziemak, 2014), (Najda, 2009), (Bórawski, 2009), (Skalik, 2011), point out, companies must adapt to the environment if they are to survive. When considering the development of companies in the industrial era, it is possible to distinguish between four distinct phases. The initial phase of manufacturing commenced during the Industrial Revolution. The second phase of industrial production, mass production, was initiated by the implementation of the technology of producing standardised and replacement parts at Cadillac Motor Car Company in 1904, leading to significant price reductions through economies of scale. However, this also reduced the manufacturer's ability to meet individual customer needs. Toyota Motor Company's lean organisational strategy, which involves the elimination of waste, has been adopted by many companies in order to enhance their capacity to meet the diverse requirements of their customers. However, these companies have continued to invest in capital-intensive fixed assets with limited flexibility, with the objective of extending product series and life cycles (Trzcielinski, 2011); (Trzelinski, Wlodarkiewicz-Klimek, Pawlowski, 2013); (Jasiulewicz-Kaczmarek, Legutko, Kluk, 2020); (Pawlowski, 2020). It has become clear that the traditional waste elimination business model is no longer adequate in view of the increasing volatility and unpredictability of the environment. The ability to succeed in a competitive environment characterised by constant, unpredictable changes creating market opportunities has become the paradigm of the fourth stage of industrial production development. The development of technology in tandem with organisational changes aimed at increasing the agility of enterprises, as well as the concept of Industry 4.0, marked the conclusion of the fourth stage of industrial production development. The concept of Industry 4.0 has gained widespread acceptance, influencing the operational practices of businesses (Jasiulewicz-Kaczmarek, Legutko, Kluk, 2020)), (Kagermann, Wahlster, Helbig, 2013), (Kagermann, 2011), (Herman, Pentek, Otto, 2015), Ribeiro at all (2023). A new market objective for enterprises was to customise products to meet the specific requirements of each

customer. This is characteristic of engineering-to-order production, but with the guarantee of low prices and short delivery cycle times typical of mass production.

Research Problem

The objective of this article is knowledge bases created for discovering business opportunities. This paper focuses on following issues:

- Does the increased availability of data and information supporting employee creativity, as well as the increased use of Big Data Analytics (BDA) tools, contribute to accelerating entry into new sectors, new domestic markets and new foreign markets?

The research

Research sample

The research sample comprised 300 medium and large companies operating in 19 industries, including 240 medium-sized companies and 60 large companies. The research was conducted between November 2024 and February 2025. Respondents were individuals directly involved in managing production and engineering, including presidents/managing directors, technical directors, and others with similar responsibilities.

Scope of research

The scope of the research encompassed the degree of accessibility to data and information, as well as the degree of utilisation of Big Data Analytics (BDA) tools to facilitate entry into new sectors, domestic markets, and foreign markets.

Research methods

For the purposes of this study, a questionnaire survey was conducted among a sample of 300 medium and large industrial enterprises in Poland. The survey was conducted through in-person interviews. The respondents were invited to respond on a 1–5 (Likert) scale. Furthermore, the data was partially processed using the Spearman's rank correlation test (Statistica 13.3).

Data processing methodology

The data collected was processed in accordance with the following methodology used in ongoing research on the Industry 4.0 project and business opportunity theory (Pawlowski, 2024):

- *Step 1* – A group of companies analysing changes occurring in environmental segments was selected from the research sample. These companies collect data that can contribute to the postulated knowledge base.

- *Step 2* – From the group of companies analysing changes occurring in environmental segments two subgroups were identified:

  - Group A - comprises companies that are rapidly entering other sectors and new domestic and foreign markets.
  - Group B comprises other enterprises that do not present the above characteristic.

- *Step 3* – In groups A and B, the following were analysed:

  - The level of availability of data and information supporting employee creativity.
  - The level of use of Big Data Analytics (BDA) technology.

These ratios indicate the proportion of enterprises in which respondents indicated the occurrence of a given characteristic at level 4 or 5 on the Likert scale, in relation to the total size of the given sample. In summary, the aforementioned ratios are indicative of the intensity of a specific characteristic within each survey sample.

- *Step 4* – Spearman's rank correlation tests were conducted for a selection of the features.

Results

Step 1 Identification of a group of companies that analysing changes occurring in environmental segments

The following questions was posed with the objective of identifying the group of companies analysing changes occurring in environmental segments:

Q1. We analyse changes taking place in the following segments of the environment:

1.1 economic,

1.2 socio-demographic,

1.3 natural environment,

1.4 technological

1.5 buyers,

1.6 suppliers,

1.7 competitors.

Answers to the question on a Likert scale of 1 to 5:

1 – we do not take such actions at all; 2 – we take such actions to a very small extent; 3 – we undertake such activities to a moderate extent; 4 – we undertake such activities to a large extent; 5 – we undertake such activities to a very large extent;

Responses on a scale of 3, 4 and 5 to all questions qualified the company to the group of companies that analysing changes occurring in environmental segments A total of 142 (47%) companies from the entire research sample (N=300) analysing changes occurring in environmental segments.

Step 2 – Identification of groups A and B in relation to the pace at which the company is entering new market

segments.

In order to identify groups A and B in relation to the pace at which the company is entering new market segments, the following question was asked:

Q2. The company's ability to:

2.1. quickly enter other sectors (industries),

2.2. quickly enter new domestic markets,

2.3. quickly enter new foreign markets.

Answers to the question on a Likert scale of 1 to 5:

1- we do not have this ability at all, 2- very little, 3- neither little nor much, 4- a lot, 5- a great deal.

Responses on a scale of 4 and 5 for all three questions classified the enterprise into group A. Companies that did not meet the above condition were classified in group B. Group A comprises 20 companies, while Group B consists of 117 companies.

Step 3 – The level of availability of data and information supporting employee creativity and the level of use of Big Data Analytics (BDA) technology.

The following questions was posed with the objective of level of availability of data and information supporting employee creativity and the level of use of Big Data Analytics (BDA) technology:

- Q3. The availability of data and information supporting employee creativity is: Answers to the question on a Likert scale of 1 to 5: 1-very low, 2-low, 3-moderate, 4-high, 5-very high.

Fifteen out of twenty companies in group A declared high and very high availability of data and information supporting their employees' creativity, which accounts for 75 per cent of this group of companies. For comparison, in group B, this indicator was thirty-three per cent.

- Q4. Use of Big Data Analytics (BDA) technology: Answers to the question on a Likert scale of 1 to 5: 1 — Not used at all, 2 — To a very small extent, 3 — To a moderate extent, 4 — To a large extent, 5 — To a very large extent.

Six out of twenty companies in group A declared large and very large extent use of BDA, which accounts for thirty three per cent of this group of companies. For comparison, in group B, this indicator was twenty four per cent.

As illustrated in Figure 1, the data provides a comparative summary of the Level of availability of data and information supporting employee creativity and the level of use of Big Data Analytics (BDA) technology examined for enterprise groups A and B. In group A of enterprises demonstrating the ability to quickly enter new sectors and new domestic and foreign markets the level of availability of data and information supporting employee creativity is significantly higher than in group B companies. The level of use of Big Data Analytics (BDA) technology is also higher in group A but this difference is not as significant as in the case of information availability.
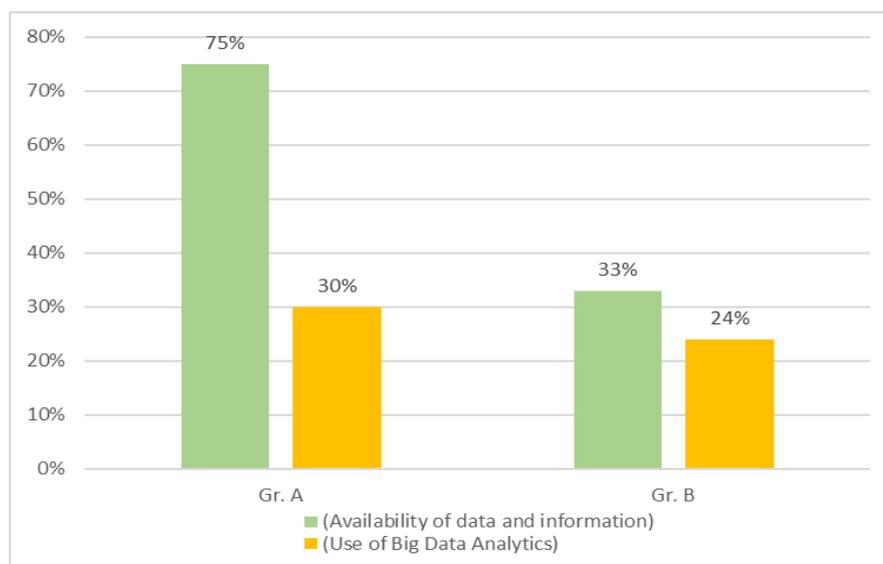

Fig 1. Level of availability of data and information supporting employee creativity and the level of use of

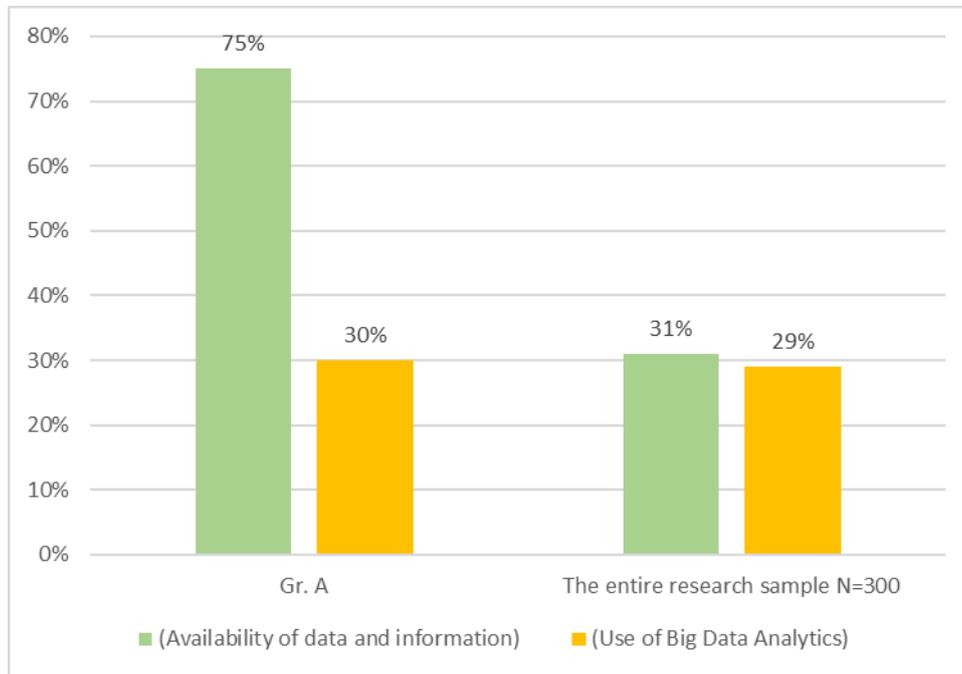**Big Data Analytics (BDA) technology in group A and group B**

Fig 2. Level of availability of data and information supporting employee creativity and the level of use of Big Data Analytics (BDA) technology in group A and entire research sample N = 300

Figure 2 shows the levels of the indicators studied in enterprise group A relative to the entire research sample N=300. As in the first comparison in group A of enterprises demonstrating the ability to quickly enter new sectors and new domestic and foreign markets the level of availability of data and information supporting employee creativity is significantly higher than in *entire research sample N = 300.* The level of use of Big Data Analytics (BDA) technology is also higher in group A but this difference is again not as significant as in the case of information availability.

Figure 3 presents the analysed changes occurring in the environment segments in group A companies.
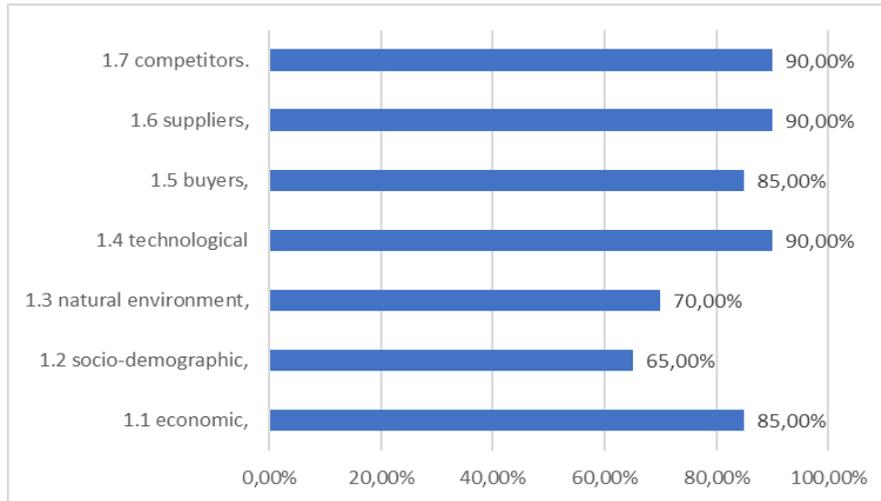
Fig 3. Analysed changes occurring in the environment segments in group A companies

Analysis of the data in Figure 3 indicates that the largest share of companies in group A (90%) analyse changes in technology sectors, suppliers and competition, which seems obvious given the rapid pace of entry into new markets.

Step 4 – Spearman's rank correlation tests

Statistical analyses were performed using Statistica 13.1 software. Spearman's rank analysis was performed with a significance level of $p<0.05000$. The strength of the correlations was assessed according to the classification shown below in Table 1. While the interpretation of the correlation coefficient does not provide a definitive answer regarding the causal relationship, it does indicate the presence of a statistical relationship between the variables under study. This, in turn, is one of the prerequisites for the existence of a causal relationship, as outlined by Małkowska-Borowczyk (2011). Table 2 and Table 3 presents the results of Spearman's Rang correlation.

Table 1: The strength of the correlations. Elaboration based on Ostasiewicz, Rusnak, Siedlecka, (2000)

Correlation coefficient value	Interpretation
r ≤0.2	Virtually no relationship
0.2< r ≤0.4	Low but clear linear correlation
0.4< r ≤ 0.7	Moderate correlation
0.7< r ≤0.9	Significant correlation
0.9< r ≤1	Very strong correlation

Table 2: Spearman's Rang correlation. Availability of data and information supporting employee creativity

		[1]	[2]	[3]	[4]
[1]	*Availability of data and information supporting employee creativity*	x	0,248158	0,318681	0,276462
[2]	Quick entry into other sectors (industries)	0,248158	x		
[3]	Quick entry into new domestic markets	0,318681		x	

[4]	Quick entry into new foreign markets	0,276462			x

Table 3: Spearman's Rang correlation. Level of use of Big Data Analytics (BDA) technology

		[1]	[2]	[3]	[4]
[1]	**Level of use of Big Data Analytics (BDA) technology**	x	-0,047763	0,071097	0,014177
[2]	Quick entry into other sectors (industries)	-0,047763	x		
[3]	Quick entry into new domestic markets	0,071097		x	
[4]	Quick entry into new foreign markets	0,014177			x

The following conclusions can be drawn from the analysis of Table 2 and Table 3:

- A significance level of $p < .05000$ is indicated by correlation coefficients that are marked in red. In addition based on the assumptions in Table 1 we can indicate low but clear linear correlation ($0.2 < r \leq 0.4$) (coefficients circled in yellow).
- The increased availability of data and information to support employee creativity is fostered by accelerating entry into new sectors, domestic markets and foreign markets.
- In table 1 all of the above results are statistically significant. They are all positive. This means that an increase in one factor is favoured by an increase in the other.
- The data analysis did not indicate any correlation between the use of (BDA tools) and the discovery of market opportunities and the pace of entering new markets.

Conclusion

The key area of interest in this article are strategic knowledge bases created for the discovery and creation of business opportunities. The aim of the paper was to answer the following question: Does the increased availability of data and information supporting employee creativity, as well as the increased use of Big Data Analytics (BDA) tools, contribute to accelerating entry into new sectors, new domestic markets and new foreign markets? in group A of enterprises demonstrating the ability to quickly enter new sectors and new domestic and foreign markets the level of availability of data and information supporting employee creativity is significantly higher than both in group B companies and in the entire research sample. The analysis of data presented in Figures 1, 2 and Table 2 suggests that the presence of data and information is a pivotal factor in the identification of market opportunities and the facilitation of accelerated entry into both domestic and foreign markets. Surprisingly, according to respondents, the level of use of Big Data Analytics (BDA) technology does not play such a significant role in the pace of discovering opportunities and entering new markets, whereas logic suggests that it should be the main factor increasing the availability of information. It is possible that respondents did not interpret the technologies they used to increase data accessibility with DBA tools. This area undoubtedly requires further research from a tool perspective.

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