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PRACTICAL APPLICATION OF PROCESS MANAGEMENT THEORY IN POLISH ENTERPRISES

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Purpose: The aim of this article is to attempt to answer the questions: Is process management theory implemented in business practice, and if so, to what extent? Are there discrepancies in the assessment of this phenomenon between academic experts and experts directly involved in business implementation?
Design/methodology/approach: The research was conducted in 2023 using a methodology that employed two methods of data collection: Computer Assisted Personal Interview (PAPI) and Computer Assisted Personal Interview (CAPI). The study involved 116 respondents, including 33 scientists and 83 practitioners. The research tool was a questionnaire. Data analysis was carried out in two stages: analysis of the overall results and analysis by dividing the population into theorists and practitioners.
Findings: The research results indicate a strong attachment of respondents to traditional and long-used definitions in the field of business process management, suggesting stability in the perception of the fundamental concepts of this field. Consistencies between knowledge and its practical application were observed. Significant differences were found between the two studied groups of respondents in the assessment of the attributes of process management in business.
Research limitations/implications: The study is limited to Polish enterprises and may not be generalizable to other contexts. Further research could explore these questions in different cultural or organizational settings.
Practical implications: The findings suggest that while traditional definitions in process management are stable and widely accepted, there are notable differences in how theorists and practitioners assess process management attributes. This highlights the need for better integration of theoretical knowledge and practical application in business processes.
Social implications: Understanding the alignment and discrepancies between academic theories and practical applications can help bridge the gap between research and practice, leading to more effective business process management strategies that benefit both academic and business communities.
Originality/value: This study addresses a gap in the literature regarding the practical applications of process management theory in Polish enterprises, providing valuable insights into how these theories are implemented and perceived by different expert groups.

Keywords: Process Management, Business Process Modeling, Organizational Conditions, Practical Application, Theoretical Foundations, Polish Enterprises.
Category of the paper: Research Paper.

1. Introduction

Business process management is generally defined as a holistic approach to managing and improving processes within an organization, aimed at optimizing their flow to achieve better efficiency, flexibility, and improved organizational performance (www5). Broadly speaking, it is treated as a field of knowledge and skills focused on an effective, continuous method of achieving business goals, requiring the integration of strategic activities across the entire organization (Association…, 2019). The most commonly used technique supporting this phenomenon is business process modeling (Chmielarz, 2015).

This science has developed from the beginning through the accumulation, unification, and inference from practical experiences. It has thus been shaped as a specific projection, a reflection of the best practices in the context of ongoing improvements in organizational functioning. Generalized models of such practices formed the scientific foundations and were consistently used in enhancing organizational performance. More advanced methods and techniques were developed to support this phenomenon, but they always depended on the human factor—experts with both practical knowledge and intuition derived from participation in successive process management optimization projects (Dumas et al., 2018).

The considerations of this paper fall within the theme of practical applications of process management theory. The literature on the subject contains numerous discussions about the characteristics of all components related to business process management, such as process identification, process analysis, modeling, improvement, and the relationships between them, as well as all procedures related to the rational implementation of process strategy in an organization. However, there are not many analyses in the literature regarding experts' attitudes towards proposed solutions and theoretical methods and their practical application. This represents a research gap that this publication attempts to at least partially fill. Therefore, the paper attempts to answer two research questions:

1. Is process management theory implemented in business reality, and if so, to what extent?
2. Are there discrepancies in the assessment of this phenomenon between academic experts and experts directly involved in business implementations?

To answer these questions, the following structure of the work was adopted. After introducing the research problems and their objectives, the second section reviews the literature on the subject. In the third and fourth sections, the research procedure is presented, specifically the selection of methods used in the research and the characteristics of the research

sample. The next section includes the results of the analysis, showing the sequence of expert assessments transitioning from theoretical assumptions to practical application. It also presents the results of a comparative analysis of the views of respondents from groups conventionally named theorists and practitioners. The conclusion contains the main findings of the research, indicating limitations and directions for further studies.

2. Development of Business Process Management Concepts in the Literature

The concept of business process management (BPM) has been intensively developing in terms of theoretical contributions, empirical research, and practical implementations. The foundations of BPM can be traced back to management concepts such as business process reengineering (Hammer, 1993; Davenport, 1993; Champy, 2002) and statistical process control (MacGregor and Kourti, 1995). The theoretical contributions in this area are extensive and multi-directional, with researchers having well-established the foundations of process management. Processes have been established as a central element of analysis in the planning, management, and control of tasks performed in enterprises. However, the process view, focusing on transforming inputs into outputs, is never an independent perspective on actions. Hence, there are many concepts for systematizing the activities that form the business process management cycle. In the classic BPM cycle, we can distinguish the following activities (de Morais et al., 2014): (1) identification, analysis, and design of processes, (2) process modeling, (3) process implementation, (4) process monitoring, and (5) process improvement. More detailed BPM cycles have also been developed, such as N. Verma's (2009), which identifies (1) identifying organizational goals, (2) identifying processes, (3) classifying processes, (4) selecting processes, (5) selecting tools, (6) implementing and improving processes, and (7) monitoring processes.

With so many concepts of the BPM cycle, it is not surprising that there is no single, universally accepted definition of BPM, and researchers formulate definitions and emphasize different elements based on their own convictions. A. Scheer et al. (2003) define BPM as the systematic analysis, improvement, and control of an organization's business processes in the context of achieving its business goals. The European Association of Business Process Management (EABPM) defines BPM as a systematic approach aimed at capturing, shaping, executing, documenting, measuring, monitoring, and managing both automated and non-automated processes to achieve coordinated and balanced enterprise goals (European…, 2009).

An important research area is process modeling, which involves giving identified, analyzed, and designed processes a graphical-textual form. Business Process Modeling Notation (BPMN) was developed to enable business users to create easily understandable graphical

representations of business processes (White, 2005; Aagesen, Krogstie, 2015; Allweyer, 2016; Geiger et al., 2018). Researchers agree that a business process model is a key element of process management, directly influencing other process-related activities. The BPM modeling field has made significant advances in recent years, including the introduction of the Business Process Maturity Model (BPMM), which is used in case studies and aims to establish a global standard for measuring BPM maturity (Rosemann, De Bruin, Hueffner, 2004).

Researchers agree that BPM is a holistic approach to management, focusing on business processes, combining different perspectives and their artifacts, and aligning all aspects of the organization with the requirements of their customers while promoting business effectiveness and efficiency (Hammer, 2010; Vom Brocke et al., 2014; Stępniak, Turek, Ziora, 2020). J.F. Chang (2016) also focuses on customers, stating that business processes are crucial in creating added value for customers, should be constantly improved, and that information technology is essential in supporting process management.

While the literature review has identified sources where researchers formulate sets of best practices in process management (Vom Brocke et al., 2014), no research was found on whether and how theoretical knowledge and best practice recommendations are translated into practice by practitioners in this field. This is a significant research gap, the filling of which will allow for further development of the field of business process management.

3. Methods

The research presented in this paper is part of the research topic "Process Management in IT Project Management" conducted in networking by representatives of three universities: the Czestochowa University of Technology, the University of Economics in Katowice and the University of Warsaw.

The research utilized a method that combined Paper and Pencil Interviewing (PAPI) and Computer Assisted Personal Interviewing (CAPI), ensuring quick and quantitatively high response rates and data security.

To achieve the objectives of this study, a modified research procedure previously used by the team (Chmielarz et al., 2023) was adopted, consisting of the following stages:

1. Literature analysis situating the conducted research within domestic and international literature, allowing for the identification of the existing research gap.
2. Specification of the research gap in this area and formulation of research questions.
3. Collection of conference materials, symposiums, seminars, traditional and online publications on the relationship between the theoretical sphere of process management and its implementation in economic reality.

4. Development of a preliminary version of the questionnaire on the practical application of process management theory in enterprises, discussing its content, comprehensibility, and relevance to potential respondents.
5. Verification of the questionnaire based on a selected group of respondents and making necessary corrections.
6. Conducting the survey in selected environments of theoretical and practical experts.
7. Preliminary preparation of data collected from the questionnaires for structural calculations, such as percentage shares of respondents on the theoretical and practical aspects of process management in enterprises.
8. Calculation of basic statistics: range, variance, and standard deviation for the results obtained for each questionnaire option.
9. Division of the entire data set into two groups of respondents: academic staff and business practitioners.
10. Calculation of the differentiation of opinions of both groups using city block distance and Euclidean distance, and assessing the significance of this differentiation using the F-Snedecor statistic.
11. Analysis and discussion of the results obtained.
12. Conclusions and determination of limitations and further research directions.

The basic statistics calculated include measures of data variation:

The analysis of theoretical and online materials allowed for the identification of the research gap, which was, in general, the identification of the diversity of knowledge about the theoretical assumptions of business process management in their implementation by experts in this field. Thus, the research hypothesis H0 was formulated:

H0 – about the existence of discrepancies between theoreticians and business practitioners regarding the assessment of the place and role of process management from a theoretical and applicational perspective, versus hypothesis H1, that such differences do not exist.

The significance of differences was assessed using the Fisher-Snedecor test. The test results and their interpretation for the accepted parameters are presented in the fifth section of the paper.

4. Characteristics of the Research Sample

The primary challenge in organizing the research was collecting primary data from an environment capable of responsibly and professionally completing the survey. It was decided that such an environment would be the III Business Process Management Symposium and the Informatics in Management scientific conference. These events took place in the second half of 2023 and involved experts from both the academic community interested in BPM and invited

business practitioners. External experts also distributed the survey within their networks, thus enriching the database with approximately thirty additional properly completed questionnaires.

The surveys were distributed among the participants of these events, the completed questionnaires were collected, digitized, calculations were performed, and the obtained results were processed. Ultimately, 116 completed surveys were collected out of 153 distributed (a 76% response rate). Since the composition of the symposium and conference participants was unknown at the time of survey distribution, we can consider that the study was conducted randomly. The survey consisted of twenty-seven substantive questions and eight demographic questions: gender, age, education, employment status, place of origin, position in the organizational structure, financial status, and industry. In the article, respondents' answers to six questions included in the survey were used.

The study involved 9% directors and board members, 10% managers at various levels, 42% experts and specialists in the field of BPM, and 16% analysts and designers. 5% of individuals with other statuses included those using ready-made applications at the enterprise or university level. Just over 7% were temporarily unemployed students of postgraduate IT studies. Therefore, we can conclude that the selection of the group was appropriate in terms of knowledge of the research subject. The high level of education of the respondents guaranteed reliable completion of the surveys: 22% of respondents had a Ph.D. or habilitation degree, and 32% had completed second-cycle studies.

Other characteristics of this sample include: a predominance of men, most respondents over the age of 36; originating from cities with over 100,000 inhabitants; a significant predominance of those working full-time, on a contract, or otherwise; and a good or very good financial situation. The first characteristic (71% men, 29% women) results from the erroneous, but fortunately changing belief in younger generations that IT is not a profession for women. In this study, over 50% of respondents were over 36 years old, which may partly explain this situation. It is easier for residents of cities to seek employment in the IT industry (more opportunities for work and education in a specific profession, etc.), hence probably 62% of respondents come from cities with over 100,000 inhabitants. According to prevailing market opinions about good salaries for IT professionals, 79% of respondents describe their financial situation as good or very good.

To examine the reliability analysis of the data, Cronbach's α coefficients were calculated. For all evaluation criteria, Cronbach's α indicates internal consistency and reliability of the sample - they were greater than 0.80 (ranging from 0.83 to 0.94). Before proceeding with the calculations, several surveys were removed due to what appeared to be random completion (e.g., always selecting the first option in questions, which sometimes led to contradictory answers).

5. Results and Discussion

The following analyses are divided into two stages. The first stage involves examining the relationship between the evaluations of theoretical assumptions related to process management and their practical implications by all respondents. In the second stage, respondents are divided into those from the academic community and business practice experts, and the differentiation of their evaluations in both aforementioned areas is examined.

We will analyze the responses to six questions, including an assessment of respondents' awareness of key concepts related to business process management. The questions were as follows:

1. Which definition best captures the concept of business process management?
2. Which of the listed characteristics of business process management do you consider the most important?
3. What benefits of business process management do you consider the most important?
4. What are the most effective areas of organizational activity for the application and improvement of business process management?
5. Which definition best captures the concept of business process modeling?
6. What are the most important benefits of process modeling in process management?

Each question was described by several options to choose from. The focus was primarily on respondents' understanding of the basic definitions of key categories related to this topic: business process management and business process modeling in the organization. Agreeing on definitions of the basic categories related to this topic allowed for the clarification and standardization of responses to subsequent questions related to the practice of business process management.

For the first question, six definitions of business process management most commonly found on the Internet were proposed. The distribution of responses was uneven. The difference between the highest and lowest share value was over 58% (variance 5%, standard deviation 23%). The majority of respondents (over 62%) selected the most general definition, where process management "…includes concepts, methods, and techniques supporting the design, administration, configuration, analysis, and implementation of business processes…" (Weske, 2019, p. 5). This definition emphasizes the analytical and methodological elements that allow for the identification, implementation, and improvement of business processes in the organization. A concise, classic definition that reduces process management to "…a set of all managerial activities related to business processes…" (Mendling, 2008, p. 5) was also well-received. In this context, business processes are processes that result in decisions affecting the functioning of the organization. Their main task is to define the operating principles of the entire organization by regulating primary and auxiliary processes. The remaining definitions (Dumas et al., 2018, p. 1; Majczyk, 2013, p. 230; Skrzypek, Hofman, 2010, p. 30; Grajewski, 2007,

p. 56) did not even reach 10% of the responses. According to respondents, business process management has little to do with either a "management philosophy," the "art and science" of supervising how work is performed in the organization, or the "creative and innovative activity" of managers. Overall, it can be concluded that the chosen approach to process management encompasses many phases and activities, from organizing work, designing processes, implementing processes, to supervising their execution, which collectively forms a management methodology (Bitkowska, 2009).

The next questions concerned the most crucial characteristics of business process management. Respondents were given a choice of three out of twelve characteristics of business process management. The distribution among the individual attributes was significantly smaller than in other cases (difference between minimum and maximum was about 14%, variance 0.24%, standard deviation 4.89%). Characteristics that received more than 10% included: defined responsibility for process execution (15%), task-oriented fluidity of activities (14%), holistic thinking beyond organizational boundaries (14%), result orientation (13%), defined causally linked changes (11%), and a systematic approach (just over 10%). These are features of a modern management style based on the personal factor and its proper direction. Organizational-legal features such as: one-person decision-making (1%), flat organizational structures (3%), consistent decentralization (almost 5%), and a broader scope of tasks and responsibilities (2%) are not clearly valued by experts. Respondents have a neutral attitude towards change management (6-7%).

The characteristics of business process management were, of course, influenced by the characteristics of the processes themselves, mainly: their identification (clearly defined boundaries, starting point, and goal), organization (in time and space), and embedding in the business reality of the given organization (15-18% of responses). The difference between the smallest and largest value is small compared to the previous cases, amounting to 6%, resulting in very low variance of 0.06% and standard deviation of 2.42%.

Another issue concerned identifying the primary benefits of implementing business process management. While the distribution of responses was relatively even (a 9% difference between the highest and lowest values, variance of 0.12%, standard deviation of 3.43%), the greatest attention was given to easier communication between various organizational units of the company (13%) and ensuring a comprehensive view of the business model (minimizing the risk of suboptimization and aiding in the search for optimal solutions—almost 13%). Slightly fewer respondents (12%) considered the most important benefits to be the reduction of errors resulting from an inefficient organizational structure and better ensuring the company's focus on the customer and their needs (almost 12%). The least significant benefits (below 5%) according to experts were providing the means to implement changes in a dynamic environment and adapting to the demands of competition in the markets served by the organization. The variance and standard deviation are at a low level. The detailed structure of opinions on the benefits of business process management implementation is presented in Figure 1.

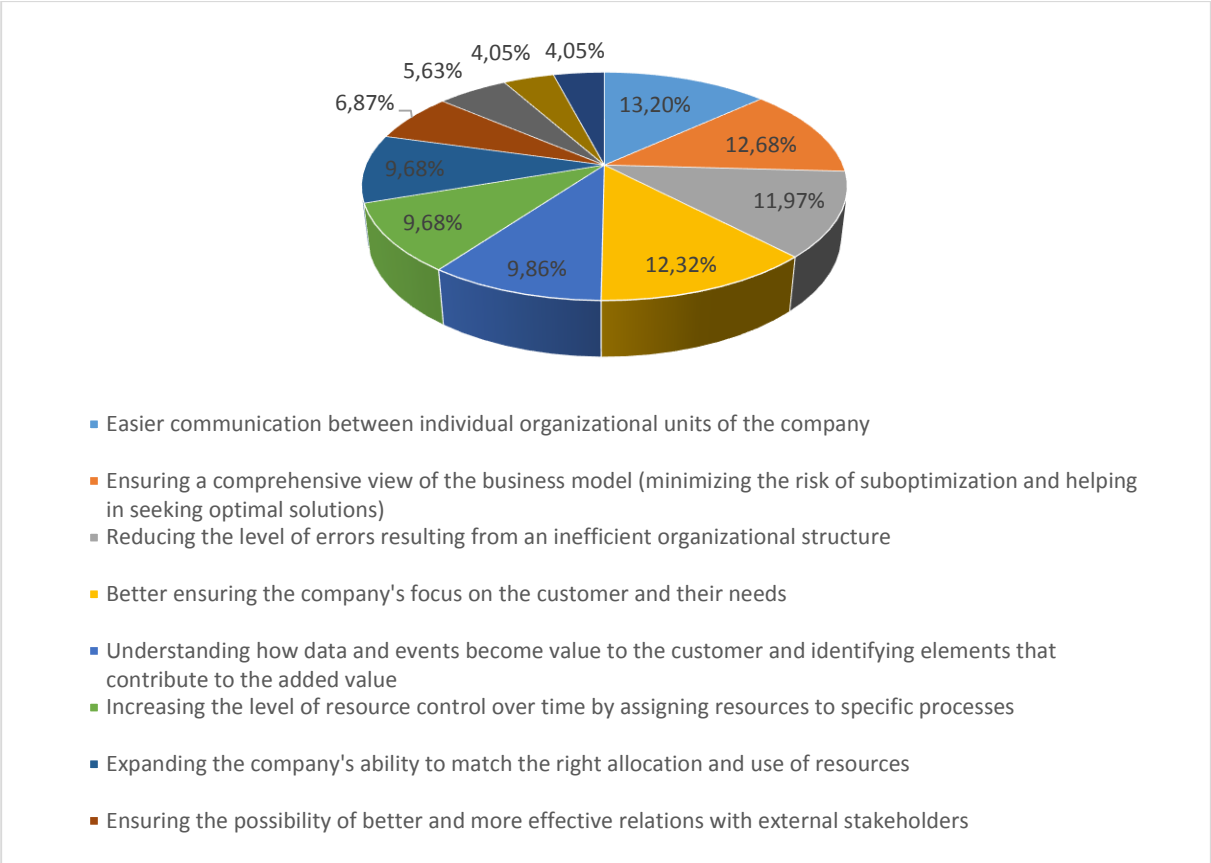

Figure 1. Benefits of Implementing Business Process Management.

Source: Own study.

The question regarding respondents' practical experiences aimed to identify the organizational activity areas where business process management can be most optimally applied, according to experts. It was recognized that two such areas, accounting for over 50% of responses, were order processing (registration, handling special orders) and sales and customer service (personalized service, preparation for collaboration with chatbots), each at 26%. Only in third place were finance and accounting (17%) (creating order templates, handling non-standard orders). Content distribution was rated relatively low (8%), and slightly higher (10%) was the HR area (e.g., documentation and workflows). Overall, the difference between the smallest and largest value is 8%, the variance is 60%, and the standard deviation is 7.74%. Figure 2 illustrates these proportions.

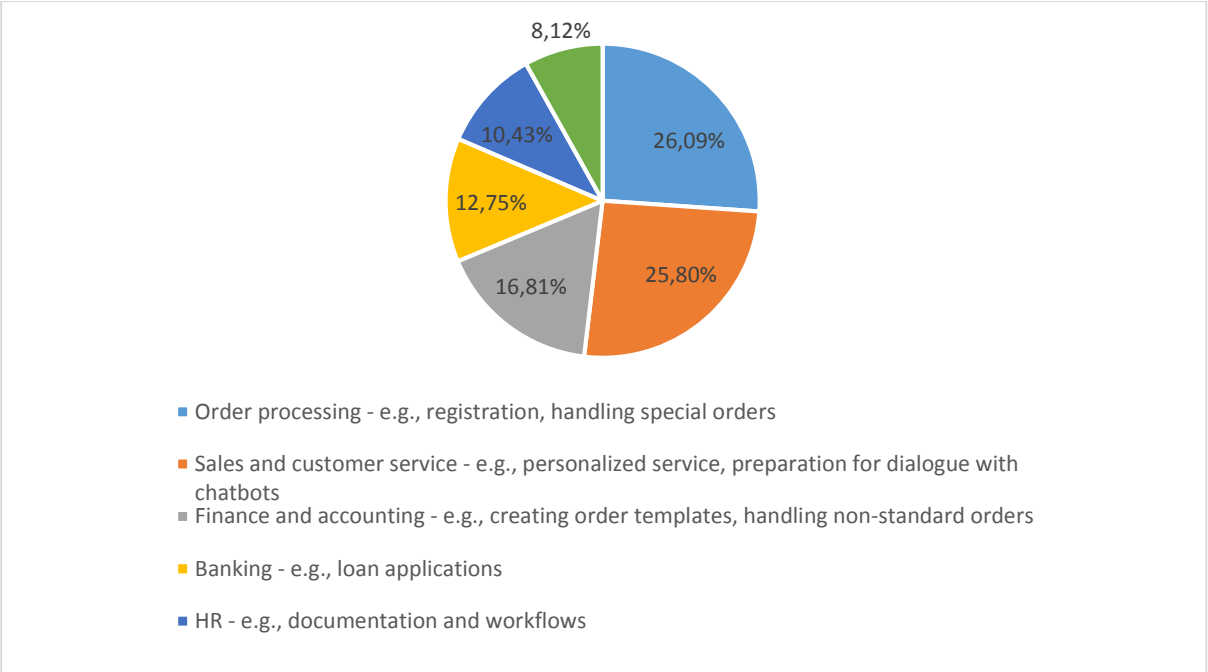

Figure 2. Organizational Activity Areas for the Most Effective Business Process Management in the Organization.

Source: Own elaboration.

The next step was to inquire about the understanding of the category of business process modeling (choosing from 5 options). In this case, the majority of responses (35%) indicated a practical approach that involves mapping and organizing the flow and sequence of steps in a process (www3), as well as a very similar formulation (26%) describing the graphical representation of business processes, where all steps are depicted according to a specific convention, providing a comprehensive overview of the tasks to be performed (www4). It should be noted that definitions referring to analytical activities (www1; Michalik, 2022), or more general ones relating to previously defined process management (www2), did not receive a positive response. Essentially, the chosen definitions reduce business process modeling to a technique that supports process management.

In this context, in practice, experts identified the main benefits of process modeling in business process management. The detailed structure is presented in Figure 3. Optimization of the entire organization's activities took first place in this ranking (24.37%), followed by the reduction of operational costs (19.05%).

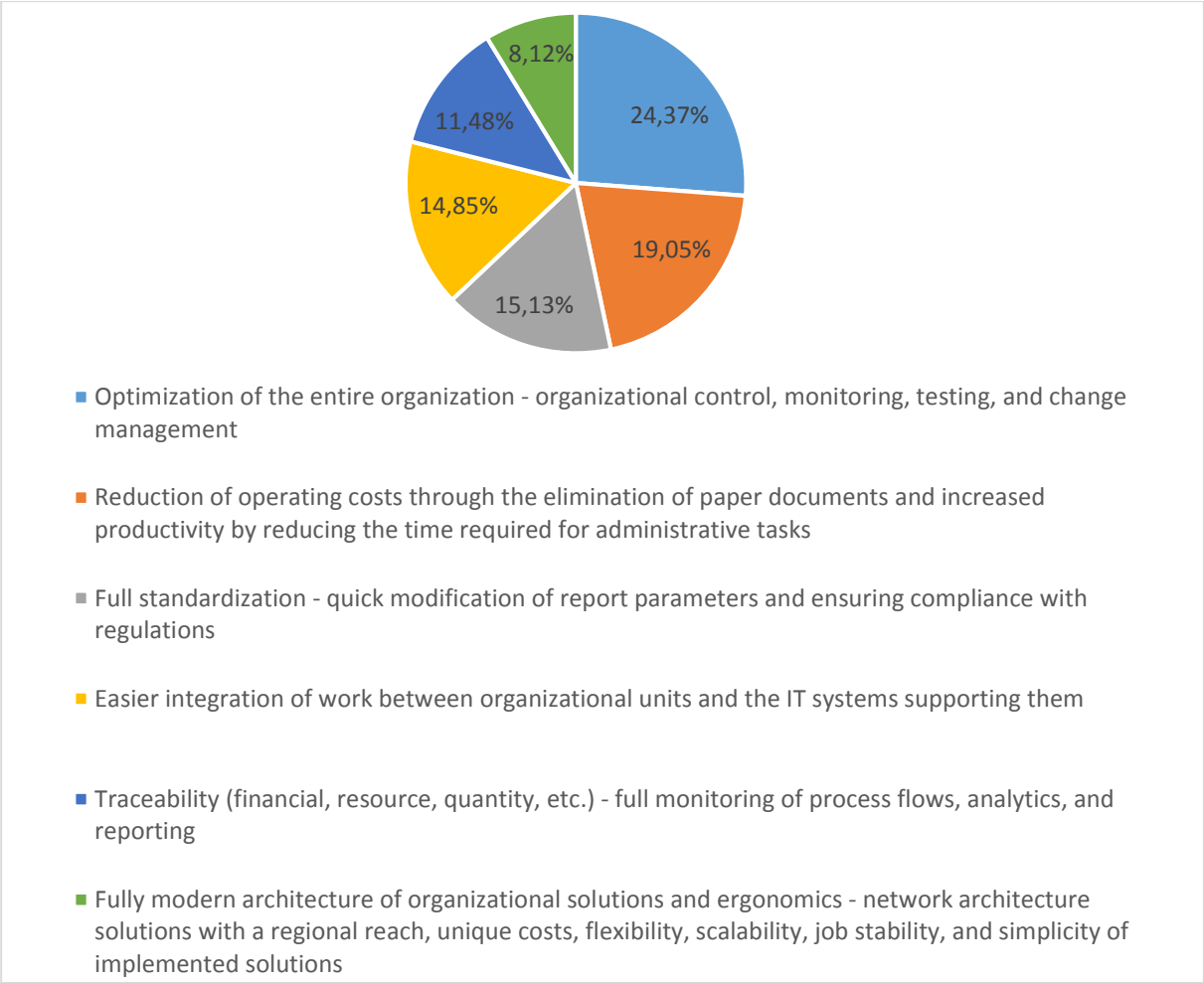

Figure 3. Operational and Functional Benefits of Using Process Modeling in Business Process Management.

Source: Own elaboration.

The difference between the most frequently chosen option and the least frequently chosen one is just over 17%, so the variance is very small at 0.004% and the standard deviation is 0.061%.

In the next stage of the analysis, the differences between the responses of respondents from academic and business environments were examined. Table 1 presents the attributes of business process management evaluation and the basic measures of variation: Manhattan distance, Euclidean distance, and the F-Snedecor test calculated to determine the statistical significance of differences between the mentioned populations. To illustrate the magnitude of the differences, the following distance measures were calculated:

1) Urban distance (Manhattan, City block) - i.e. the sum of absolute differences between the same attributes in the next sample. The impact of single large differences is attenuated, so they are more difficult to detect in the population. It is calculated according to the formula:

$$Cd = \sum_{i=1}^{n} |x_i - y_i| \quad (1)$$

where:

Cd – urban distance,

xi, yi – compared attributes.

2) Euclidean distance - the square root of the sum of attribute differences squared, geometric distance in multidimensional space. The Euclidean distance formula is calculated by definition:

$$Ce = \sqrt[2]{\sum_{i=1}^{n} (x_i - y_i)^2} \quad (2)$$

3) To test the significance of differences in the variance of the studied variable in the two populations, the right-sided F-Snedecor test was used. If s12 and s22 are independent variances from a population with normal distributions, then the statistics:

$$F - Snedecora = \frac{s_1^2}{s_s^2} \quad (3)$$

where: $s_1^2 > s_s^2$ has an F-Snedecor distribution with the numbers of degrees of freedom u = n1 - 1 and v = n2 - 1, where u is the number of degrees of freedom for the variance in the numerator and v is the number of degrees of freedom for the variance in the denominator.

The research hypothesis was put forward about the existing differences in opinions on process management between theoreticians and economic practitioners with an assumed probability of = 0.05. To prove this hypothesis, the significance level α was calculated for the right-sided F-Snedecor distribution. The Snedecor F test was used here to compare the degree of significance of two sets of data (the opinions of theoreticians and practitioners) and compare it with the p-value determined based on the test values (i.e. compare the test results of the $F_{calculated}$ test value with the $Fkr_{tabulated}$ value). If $p \leq \alpha$, we reject the hypothesis, if $p \geq \alpha$, we accept the hypothesis. The results are presented in Table 1.

Table 1.

Differences between the opinions of respondents from the academic environment and those related to business practice

Attributes of Business Process Management and Process Modeling in the Organization	City Block Distance	Euclidean Distance	$F_{calculated}$	$Fkr_{tabulated}$
The most accurate definition of business process management	33,02%	1,17%	1,4484	2,4936
The most important features of business process management	25,16%	0,51%	1,7247	2,3803
The most significant benefits of business process management	53,84%	1,93%	1,0394	2,1231
The most effective areas of organizational activities for applying and improving business process management	0,02%	0,00002%	1,0800	2,4936
The most accurate definition of business process modeling	37,26%	1,68%	1,0225	2,6261
The most important benefits of process modeling in process management	17,59%	0,43%	1,0710	2,3562

Source: Own study.

Analysis of the data in Table 1 leads to the following conclusions:

The most accurate definition of business process management shows a significant city block distance of 33.02% and a Euclidean distance of 1.17%. However, the F-test value of 1.4484 is lower than the critical value of 2.4936, indicating no statistically significant difference between the responses of academics and practitioners.

The most important features of business process management have a city block distance of 25.16% and a Euclidean distance of 0.51%. The calculated F-test value indicates no significant differences in the opinions of both groups.

The most significant benefits of business process management exhibit the highest city block distance of 53.84% and a Euclidean distance of 1.93%. Despite this, the F-test value of 1.0394, which is lower than the critical value of 2.1231, suggests no significant differences in opinions between academics and practitioners.

The most effective areas of organizational activities for applying and improving business process management have the lowest city block distance of 0.02% and a minimal Euclidean distance of 0.00002%. The F-test value indicates no significant differences in the views of both groups.

The most accurate definition of business process modeling shows a city block distance of 37.26% and a Euclidean distance of 1.68%. The F-test value indicates no statistically significant differences in the definitions presented by academics and practitioners.

The most important benefits of process modeling in process management exhibit a city block distance of 17.59% and a Euclidean distance of 0.43%. The F-test value indicates no significant differences in the perceived benefits between academics and practitioners.

These results indicate that there is a general convergence of views between respondents from academic and practical environments on various aspects of business process management and process modeling.

6. Summary

The responses obtained in the first part of the study were the result of over one hundred opinions from respondents representing two different expert environments: theorists and practitioners, thus they were averaged. Nevertheless, they indicated an attachment to the simplest, proven, and long-standing definitions of basic categories related to business process management. However, since very general answers were chosen, there was a positive correlation between theoretical and practical responses overall. The more detailed and concrete assessments provided by respondents from the practitioner group indicate a gradual evolution in the implementation of process management. Some previously expressed opinions, such as the importance of process management in organizational strategy, shifted the significance of

process modeling to a lower management level, clearly treating it as a tool for managing business processes. The generalized results of the first stage allowed for the tracking of trends linking the averaged, defined views on the theoretical aspects of process management and the way they were subsequently translated and applied in business practice. However, they did not show any differentiation within this group, treating it uniformly as a homogeneous research sample.

In search of an answer to the second research question—whether there are discrepancies in the evaluation of this phenomenon between academic experts and experts engaged in business practice—it was intentionally assumed that the study would involve two different, albeit overlapping groups of respondents. Many process management theorists from the academic environment have experience in business practice or work in it, and experts from business practice often have connections with academic institutions.

In the second stage of the study, comparative analyses of the views and opinions of the two indicated groups of respondents were conducted.

The analysis shows that both academic and practical environments have a relatively high degree of agreement on the definitions of business process management and process modeling, indicating a shared understanding of these concepts across different settings. The uniform importance of key features, such as the relatively low variance and standard deviation in responses regarding the most important features of business process management (City Block Distance 25.16% and Euclidean distance 0.51%), suggests a general consensus among respondents on which features are crucial for effective process management.

The uniformity of responses concerning the main benefits of business process management, despite the high Manhattan distance of 53.84%, indicates that both academics and practitioners recognize similar advantages in implementing process management strategies. The low F-test value further supports this common perspective on recognizing the benefits of process management.

The identification of the most effective areas for the application and improvement of business process management, showing minimal variance (Manhattan distance 0.02%), suggests a clear and shared understanding among respondents of where business process management can be most beneficially applied within an organization.

In summary, the above arguments confirm that there is significant agreement between academic theories and practical applications of business process management and process modeling, highlighting a consistent understanding and valuation of these concepts across different professional environments.

References

1. Aagesen, G., Krogstie, J. (2015). BPMN 2.0 for Modeling Business Processes. In: J. vom Brocke, M. Rosemann (eds.), *Handbook on Business Process Management 1. International Handbooks on Information Systems*. Berlin/Heidelberg: Springer, https://doi.org/10.1007/978-3-642-45100-3_10
2. Allweyer, T. (2016). *BPMN 2.0: introduction to the standard for business process modeling.* BoD–Books on Demand.
3. Association of Business Process Management Professional International, Business Process Management Competency Model, ABPMP International (2019).
4. Bitkowska, A. (2009). *Zarządzanie procesami biznesowymi w przedsiębiorstwie*. Vizja Press & IT.
5. Brilman, J. (2002). *Nowoczesne koncepcje i metody zarządzania*. Warszawa: PWE.
6. Champy, J. (2002). *X-Engineering the Corporation: The Next Frontier of Business Performance*. Grand Central Publishing.
7. Chang, J.F. (2016). *Business process management systems: strategy and implementation.* CRC Press.
8. Chmielarz, W. (2015). *Information Technology Project Management*. Warszawa: Wydawnictwo Naukowe WZ UW.
9. Chmielarz, W., Zborowski, M., Jelonek, D., Sołtysik-Piorunkiewicz, A., Wiechetek, Ł. (2023). Świadomość możliwości kształtowania kariery informatyka. Analiza porównawcza na wybranych uczelniach w Polsce. *Przegląd Organizacji, no. 3(998),* pp. 185-196.
10. Davenport, T.H. (1993). *Process innovation: reengineering work through information technology*. Cambridge: Harvard Business Press.
11. de Morais, R.M., Kazan, S., de Padua, S.I.D., Costa, A.L. (2014). An analysis of BPM lifecycles: from a literature review to a framework proposal. *Business Process Management Journal, 20(3),* 412-432.
12. Dumas, M., La Rosa, M., Mendling, J, Reijers, H. (2018). *Fundamentals of Business Process Management.* Springer.
13. European Association of Business Process Management – EABPM, Business Process Management, Common Body of Knowledge. Gießen (2009).
14. Geiger, M., Harrer, S., Lenhard, J., Wirtz G. (2018). BPMN 2.0: The state of support and implementation. *Future Generation Computer Systems, 80,* 250-262.
15. Grajewski, P. (2007). Organizacja procesowa: Projektowanie i konfiguracja. Warszawa: PWE.
16. Hammer, M. (2010).What is Business Process Management? In: J. vom Brocke, Rosemann (eds.), *Handbook on Business Process Management 1: Introduction, Methods and Information Systems.* Berlin, Germany: Springer, 3-16.

17. Hammer, M., Champy, J. (1993). *Reengineering the Corporation, A Manifesto for Business Revolution.* New York: Harper Business.
18. Johansson, H.J., McHugh, P., Pendlebury, A.J., Wheeler III W.A. (1993). *Business process reengineering: Breakpoint strategies for market dominance.* John Wiley & Sons.
19. MacGregor, J.F., Kourti, T. (1995). Statistical process control of multivariate processes. *Control Engineering Practice, 3(3),* 403-414.
20. Majczyk, J. (2013). Zarządzanie procesami – ujęcie systemowe. In: M. Kostera (ed.), *Doradztwo organizacyjne: ujęcie systemowe* (pp. 223-248). Poltext.
21. Mendling, J. (2008). *Metrics for Process Models*. Springer-Verlag.
22. Michalik, J. *Modelowanie procesów biznesowych - na czym polega?* https://archman.pl/modelowanie-procesow-biznesowych-w-firmie/, 12.10.2023.
23. Oleś-Filiks, M. (2023). Postrzeganie przez studentów możliwości wykorzystania modelowania procesów biznesowych w usprawnianiu organizacji. *Studia i Materiały*, *2*. Uniwersytet Warszawski, Wydział Zarządzania, pp. 97-109.
24. Perechuda, K. (2000). *Zarządzanie przedsiębiorstwem przyszłości - koncepcje, modele, metody*. Warszawa: Placet.
25. Rosemann, M., De Bruin, T., Hueffner, T. (2004). A model for business process management maturity. *ACIS 2004 Proceedings, 6*.
26. Scheer, A.W., Abolhassan, F., Jost, W., Kirchmer, M. (2003). *Business process change management. ARIS in Practice.* Berlin/Heidelberg.
27. Skrzypek, E., Hofman, M. (2010). *Zarządzanie Procesami w Przedsiębiorstwie*. Wolters Kluwer.
28. Stępniak, C., Turek, T., Ziora, L. (2020). The Role of Corporate Ontology in the IT Support of Processes Management. *Intelligent Systems and Applications: Proceedings of the 2019 Intelligent Systems Conference (IntelliSys), Vol. 1* (pp. 1285-1297). Springer International Publishing.
29. Verma, N. (2009). *Business Process Management: Profiting from Process*. New Delhi: Global India.
30. Vom Brocke, J., Schmiedel, T., Recker, J., Trkman, P., Mertens, W., Viaene S. (2014). Ten principles of good business process management. *Business Process Management Journal, 20(4),* 530-548.
31. Weske, M. (2019). *Business Process Management: Concepts, Languages, Architectures*. Berlin/Heidelberg: Springer.
32. White, S. (2005). Using BPMN to model a BPEL process. *BPTrends, 3(3),* 1-18.
33. www1, https://flowdog.io/baza-wiedzy/artykuly-blogowe/modelowanie-procesow-biznesowych/
34. www2, https://jacekantczak.pl/modelowanie-procesow-biznesowych
35. www3, https://pl.wikipedia.org/wiki/Modelowanie_proces%C3%B3w_biznesowych
36. www4, https://systell.pl/slownik-pojec/modelowanie-procesow-biznesowych/; 2022

37. www5, https://www.gov.pl/web/popcwsparcie/zarzadzanie-procesami-biznesowymi-bpm, 11.09.2023
38. Ziemba, E., Obłąk, I. (2012). Systemy informatyczne w organizacjach zorientowanych procesowo. *Problemy Zarządzania, 10(38),* 8-24.