Application of PrOACT Model in Innovation Decision-Making

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Innovations represent one of the key factors in improving business and a source of a company's competitive advantage. The PrOACT model has been identified as one of the methods that provide decision-makers with a holistic and systemic approach to decision-making. The research in this paper focuses on decision-making about innovations within the PrOACT framework. The research goal is to emphasize the importance of a systematic approach to innovation decision-making within the PrOACT framework. A case study was applied as a qualitative method of empirical research, involving a comprehensive analysis of collected data. Interviews were used as a primary data collection technique, and the analysis of regular financial reports served as a secondary data collection technique. The theoretical and methodological contribution of the paper lies in providing a holistic framework for innovation decision-making through the application of the PrOACT decision-making model. In practical terms, the research can offer guidance to managers of small businesses, especially teams in the IT industry, for decision-making based on the PrOACT model, allowing them to define goals adequately and consider relevant alternatives in making innovative decisions.

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1 Introduction

The rapid growth of information and communication technologies, increasing competition, the rate of technological changes, and global economic circumstances that lead to more frequent networking are some of the most important factors that have radically changed the functioning of modern organizations. In the face of such complex and dynamic business conditions, the need for innovation has never been more expressed (Gumusluoglu & Ilsev, 2009; Tellis et al., 2009; Zlatanović, 2020). Accordingly, innovations can be seen as a driver of economic development that plays a crucial role in enhancing the competitiveness of companies and national economies (Rosenzweig, 2017). Due to the globalization of business, companies are compelled to engage in intense competitive battles, especially in high-tech industries (Horn & Brem, 2013). This results in contemporary business conditions requiring companies to possess a complex set of skills and knowledge to ensure continuous innovation of their products, services, and processes (Mosey et al., 2002). Similarly, Du Preez & Louw (2008) indicate that successful innovation requires an integrated decision-making process, product design, and the implementation of new technologies. Managing complex information is an important part of activities in the modern decision-making process. Today's real-world problems involve complex sets of data, different perceptions, and numerous interest groups involved in the decision-making process (Kazimieras, Zavadskas et al., 2019). In fact, decision-making in the context of innovations falls within the domain of multicriteria decision-making based on conflicting goals and multiple decision criteria. Therefore, the use of the PrOACT decision-making approach as a simple and practical method of multicriteria decision-making is crucial for resolving complex problem situations. This method helps decision-makers to systematically think about all potential alternatives and their consequences, by identifying key decision elements and understanding them individually. It enables them to make the best decision, through the application of compensatory decision-making methods (Nikolić, 2024).

Certain researches examine the decision-making process in the context of innovations (e.g. Van Riel et al., 2004; Schneckenberg et al., 2017; Mosey et al., 2002), and some researches examine the PrOACT model of decision making (e.g. Utami, 2015; Nixon et al., 2016; Albert et al., 2018). However, no research deals with the application of the PrOACT model in innovation decision-making to the best of the authors' knowledge. This represents a certain research gap that this study aims to

address. Accordingly, the research subject of this paper is innovation decision-making, viewed within the conceptual framework of the PrOACT decision-making model. The research goal is to emphasize the importance of a systematic approach to innovation decision-making through the conceptual framework of the PrOACT model. The paper is structured into three connected parts. The first part presents some of the key theoretical aspects of the concept of innovation, the decision-making process, and the PrOACT decision-making model. Then, the research methodology is presented, explaining how the case study was created, data collection methods that were used, such as interviews and the analysis of regular financial reports of the company. The results of the conducted case study and their discussion are the subject of the third and fourth parts of the paper. Finally, certain conclusions, identified implications, and limitations of the conducted research are presented.

2 Literature review

Kariuki & Kilka (2017) state that innovations can be described as the implementation of discoveries, or as a process in which new products, systems, or processes emerge. Similarly, viewing innovations as an essential driver of economic success and growth, Schumpeter (1934) observes innovations as new products, new production methods, new markets, new supply sources, and new ways of organizations. In other words, innovations represent the crucial point of economic changes (Lundvall & Nielsen, 2007), that make innovative concepts increasingly significant in business practice. This is particularly the case for small and medium-sized enterprises, where innovative tools, such as innovative organizational structures, are widely applied (Horn & Brem, 2013). Therefore, it can be said that innovative organizations are those that consistently practice innovative behavior over a certain period (Nilakanta, 1996). For such organizations, the adoption of innovations is of particular importance, leading to increased organizational performance and improved business operations (Dos Santos & Pfeffers, 1995), as well as decision-making processes in unpredictable and unstable environments (Schneckenberg et al., 2017).

The complexity and uncertainty of the environment require organizations to manage information rationally, i.e., to create knowledge, to coordinate activities in problem-solving processes and manage environmental uncertainty (Nicolas, 2004). Crawford (1997) indicates that decisions are made in different forms, at different

organizational levels, and different stages of the innovation process. Additionally, the decision-making process is defined by the perspective from which it is observed, where the same internal or external decision stimulants can be perceived and interpreted differently by managers in different or even within the same organization (Papadakis et al., 1998). Characteristics of the decision-making process that can significantly influence the decision outcome include the duration of the decision-making process, the level of rationality of the decision-maker, the degree of political activity in the decision-making process, the number of individuals/groups involved in the process, and the level of compatibility/conflict of values and opinions of decision-makers (Goll & Rasheed, 2005). Differences in the level and nature of uncertainty, as well as the intensity of the consequences a decision has on organizational operations, can also be expected between different innovation phases. For example, preoperative screening and analysis of the business environment are crucial, where new products are assessed based on potential profitability, as well as the entire operational development phase of a new product or service (Van Riel, 2004).

Hammond et al. (1999) describe a structured approach to analyzing problems with multiple criteria and alternatives. This model emphasizes the importance of a valid Problem definition, identifying the most important outcomes or goals of the decision under consideration, and generating a creative and diverse list of decision alternatives or options. The final steps in the PrOACT model include analyzing the consequences of each alternative, with the goal of determining the usefulness of each alternative according to defined objectives, as well as making trade-offs or compromises using the dominated alternative and even swap method, which is used when decision-makers are in a situation where they must choose between conflicting goals (Barksdale & Smith, 2014). When using the dominant alternative method, it is necessary to respect to the following decision rules: if alternative A is better than alternative B for some goals and is not worse than B for other goals, then B can be eliminated from further consideration. In this case, it is said that alternative A dominates alternative B – B is the dominant alternative. On the other hand, in the even swap method, if all alternatives are equally rated for a considered goal (e.g., costs), then that goal can be disregarded when choosing between alternatives. In this process, when multiple alternatives are in play, a consequences table can be helpful (Hammond et al., 1999).

3 Methodology

A case study, as a qualitative method of empirical research, involves a comprehensive analysis and discussion of data to uncover causality and established relationships in the examined problem situations (Zhang & Holzer, 2002). The case study is characterized by the ability to elaborate and analyze the objects of study in detail, by revealing different perspectives on the observed problem (Jiao et al., 2017). Therefore, to determine the key innovation decision-making factors using the PrOACT model, primary data was collected through interviews with the company owner. Simultaneously, based on insights and the analysis of regular financial reports, secondary data was collected. In this research, the focus was on the application of a systematic decision-making process based on the identification and analysis of all relevant alternatives, as well as consideration of the goals of different interest groups. The application of the PrOACT decision-making model allows the identification and classification of various decision factors and determining their relative importance (Nixon et al., 2016), making it suitable for addressing the examined business problem. To protect data privacy, the company considered in the case study will be referred to as Company X.

Case Study

Company X is a relatively young company. It was founded in 2018, and in the first two years, it experienced a significant increase in all relevant business indicators. The owner of the company is a young entrepreneur who managed to turn his hobby into a profitable business. In the initial two years, the company exclusively focused on the development of computer games. He successfully assembled a team of 5 employees, primarily individuals with IT backgrounds, while he independently handled finance, marketing, and management tasks. After several successfully completed projects, the company was profitable. Below is an overview of the level and dynamics of the company's total revenues and expenses for the first two years of operation:

Table 1: Analysis of the structure of total revenue of Company X

	2018		2019	
	Absolute amount	%	Absolute amount	%
Business revenue	4.870.593*	88,2%	4.153.493	88,5%
Financial revenue	70.278	1,3%	73.884	1,6%
Income from revaluation of other assets measured at fair value through profit or loss	566.207	10,2%	443.799	9,4%
Non-business income	17.448	0,3%	23.691	0,5%
Total revenue	5.524.526	100%	4.694.867	100%

*All amounts are expressed in Serbian dinars (RSD)
Source: Regular financial reports of Company X

Table 2: Analysis of the structure of total expenses of Company X

	2018		2019	
	Absolute amount	%	Absolute amount	%
Operating expenses	3.944.024*	87,8%	3.212.230	84,2%
Financial expenses	47.940	1,1%	40.844	1,1%
Expenses from the revaluation of other assets measured at fair value through profit or loss	490.341	10,9%	544.030	14,3%
Non-business expenses	7.708	0,2%	17.957	0,5%
Total expenses	4.490.013	100%	3.815.061	100%

*All amounts are expressed in Serbian dinars (RSD)
Source: Regular financial reports of Company X

After the first two years, the company managed to significantly reduce its operating costs while keeping sales relatively stable, considering it operates in a dynamic market and primarily sells its products to foreign companies. So far, the owner has not faced any business problems, highlighting that his main advantage is a friendly relationship with employees. Every decision is made in collaboration with his team, characterized by a high level of creativity and mutual loyalty. Employees express satisfaction with the work environment, and salaries are competitive in the observed sector. However, at the beginning of 2020, an unexpected turn of events occurred. Their largest customer in the German market decided to end the collaboration. There was a minor error in one of the game's programming codes, but given the intense competition, the customer decided to end the partnership and accept an offer from a start-up company. This surprised the main manager of the company. Analyzing the previous business operations, he decided to take out a bank loan of 4,000,000 dinars to empower his employees with the latest technology and software

in this field. The decision was made based on a detailed analysis of the structure of funding sources (Table 3).

Table 3: Analysis of the structure of funding sources for Company X

	2018		2019	
	Absolute amount	%	Absolute amount	%
Equity	7.571.570*	95,2%	8.048.166	95,8%
Debt, liabilities, and reserves	0	0%	0	0%
Short-term liabilities	381.505	4,8%	355.510	4,2%
Total liabilities	7.953.075	100%	8.403.676	100%

*All amounts are expressed in Serbian dinars (RSD)
Source: Regular financial reports of Company X

The company did not have long-term liabilities, and considering that the return on equity was higher than the return on total assets, new borrowing for Company X would contribute to an increase in the profitability of equity. The owner believed that this was the correct financial decision; however, due to the loss of the largest customer, he is now facing a problem. The question is whether he will be able to repay the given loan. Through market analysis, an Austrian company engaged in selling mobile phone games was identified. They could potentially replace the revenue from the lost customer, if not double it, given the expansion of that market segment. However, for the target company to accept the project proposal from Company X, a quick response is needed, and a successful game must be developed within a short timeframe. Additionally, the problem lies in the fact that the company's team is accustomed to working on computer games, which, although similar, require specific expertise and thorough research of the segment. On the other hand, they can continue developing computer games, but without a major customer, this would mean simultaneously focusing on multiple projects. This would require each employee to work on one or more projects, potentially jeopardizing the high performance achieved through teamwork.

4 Results

According to Hammond et al. (1999), the PrOACT model is used to structure a problem situation and segment the decision-making process. It is employed for the valid formulation of problems, goals, determining different alternatives, assessing their consequences and leading to optimal decision-making. Based on the described

problem situation, the choice of the best alternative is outlined through the identification of individual elements that form the basis of the application of the PrOACT decision-making model: problem identification, goal setting, alternative development, consequence evaluation, and selection.

1. Problem Formulation: Company X is facing the loss of a significant international customer, jeopardizing its future business revenue used to cover expenses, including the repayment of the principal and interest on a long-term loan. Additionally, the company is at a crossroads between staying in the existing market or entering a more profitable market niche, potentially questioning its innovative capacity.

2. List of Goals:
Goal 1: Compensate and overcome the decline in sales revenue due to the loss of the international customer.
Goal 2: Ensure the repayment of the principal and interest on the long-term debt.
Goal 3: Enhance the company's innovation capacity in the future.

3. List of Stakeholders: The bank that approved the loan, company employees, existing and potential business partners, competition in the existing and potentially new market segment.

4. List of Alternatives:

Table 4: List of alternatives for Company X

Alternative 1
To timely do an innovation project that will enable collaboration with a new Austrian customer.
Uncertainty related to Alternative 1: The company lacks sufficient expertise in this field, leading to the hiring of new employees within the company. There is a question regarding the time pressure for completing the innovation project.
Risk tolerance associated with Alternative 1: High
Stakeholders (how stakeholders can influence Alternative 1 and how the alternative affects stakeholders): The bank would benefit as it ensures loan repayment. Company employees would have to endure stressful changes, including adapting to new colleagues, working under time pressure, and rapidly acquiring new knowledge and skills. By entering a new market segment and gaining expertise in the given field, the company would open doors to a growing market, reaping multiple benefits and expanding the base of potential clients. Additionally, by entering a new segment, the company will need to include new competitors in the business environment analysis, that involves quick differentiation.
Alternative 2
Continue operations in the existing area, with the company working on acquiring new projects or increasing the number of projects with existing clients.

Uncertainty related to Alternative 2: Given that the company has had lower-value collaborations with certain companies, the need for business partners for new computer games arises, jeopardizing the possibility of achieving sufficiently high sales revenue. On the other hand, time is needed to conduct a detailed market analysis of potential clients in the same field and to consider the possibility of meeting their needs.
Risk tolerance associated with Alternative 2: Low
Stakeholders (how stakeholders can influence Alternative 2 and how the alternative affects stakeholders): The bank may be at risk if the company lacks sufficient funds to repay the debt, resulting in late interest charges and, consequently, the company's bankruptcy. Company employees can continue working under the same conditions, avoiding stress caused by changes in the company. The company is more familiar with the existing market segment and the companies within it, which would be facilitated compared to entering a new niche. Additionally, competition conditions in the existing market remain unchanged.
Alternative 3
Stay in the existing market, gradually entering the area of developing mobile phone games.
Uncertainty related to Alternative 3: Possibility of delayed payment of obligations in the upcoming accounting periods while the company establishes itself in both market segments. The company will not meet the deadline to write a project that would attract the considered major customer, opting for a gradual entry into the niche.
Risk tolerance associated with Alternative 3: Medium
Stakeholders (how stakeholders can influence Alternative 3 and how the alternative affects stakeholders): The bank may charge late interest in case of delays. Company employees will gradually adapt to the change, having enough time to acquire new knowledge and skills. The company is familiar with existing partners, and it would have time to conduct a detailed analysis of potential companies in the new segment. The same applies to competitors.

Source: Authors

5. Table of consequences. Within Table 5, consequences for all three considered alternatives are presented based on the previously set goals. Projected sales revenue, as well as potential late interest charges, are expressed in monetary units (RSD), while the level of innovativeness for each alternative is represented by ratings from A to C, where A is used for the highest and C for the lowest level of innovativeness. Therefore, in the case of alternative 1, the projected sales revenue is the highest, the company would not incur the obligation to pay late interest charges, and the innovativeness level is high due to the development of a completely new product, i.e., the adoption of new knowledge and skills. Then, in the case of alternatives 2 and 3, the company would have to pay late interest due to unpaid obligations, and the level of innovativeness is rated lower compared to alternative 1.

Table 5: Table of Consequences for Company X

Goals	Alternative 1	Alternative 2	Alternative 3
Goal 1 (projected sales revenue for the year 2020)	7.000.000	4.000.000	4.500.000
Goal 2 (potential late payment interest)	-	250.000	300.000
Goal 3 (level of innovativeness)	A	C	B

Source: Authors

6. Trade-offs. In Table 6, the consequences of alternatives are ranked based on their contribution to achieving the specified goals. The ranking is done with numbers from 1 to 3, where alternatives that contribute the most to goal achievement are assigned the number 1, and those that contribute the least are assigned the number 3. For example, Alternative 1 has the highest projected sales revenue, the highest degree of innovation, and no potential late payment interest, making it ranked as the best in all three considered goals.

Table 6: Decision Table for Company X

Goals	Alternative 1	Alternative 2	Alternative 3
Goal 1	1	3	2
Goal 2	1	2	3
Goal 3	1	3	2

Source: Authors

7. Decision. According to Table 6, it can be concluded that Alternative 1 dominates over the other two alternatives, as it is better evaluated according to all three goals. This further leads to the choice of Alternative 1. Therefore, the decision of Company X is: To timely do an innovation project that will enable collaboration with a new Austrian customer. This will result in generating the highest sales revenue compared to the other two alternatives, developing new products, acquiring new knowledge and skills, and the company will not incur penalty interest in the process.

5 Discussion

By analyzing the data obtained in the case study of Company X, it can be concluded that it is a young company with a low degree of formalization, which positively influences the level of innovativeness. In highly formalized organizations, the

existence of explicit rules and procedures is likely to have a negative impact on idea generation, company flexibility, and innovation (Bidault & Cummings, 1994). The organizational culture is characterized by a high level of entrepreneurial spirit and tolerance for mistakes. Slater & Navar (1995) and Wallach (1983) argued that a supportive organizational climate positively affects the creation and exchange of knowledge among employees and team cohesion. Additionally, the company features new technology, which positively impacts innovation (Rosenzweig, 2017). However, employees of the company need to work on acquiring knowledge and skills to handle new software and programs to overcome the innovation barrier involving a lack of narrowly qualified employees. Darroch (2005) highlights that companies that effectively manage the knowledge of their employees have a higher level of innovativeness. Considering innovation barriers, time constraints create additional pressure on employees, representing an organizational factor with a negative impact on employee creativity (Hsu & Fan, 2010). Therefore, it is recommended for the company to overcome the time barrier with specific organizational mechanisms that limit employee innovativeness. Given that the best available alternative has been chosen through a systematic approach, whose elements are theoretically validated, it is concluded that the PrOACT model is an adequate method for solving routine problems as well as complex organizational situations (Barksdale & Smith, 2014).

6 Conclusions

Starting from the set research goal, the obtained results indicate the following relevant conclusions. The results of the conducted case study show that the conceptual framework of the PrOACT model is significant for a systematic approach to innovation decision-making. Additionally, the importance of organizational culture flexibility, technology, employee expertise, and time constraints on the company's innovativeness has been identified.

In terms of overall results, certain theoretical and practical implications can be identified. The contribution of the paper is primarily methodological. It is reflected in overcoming the identified research gap related to the scarcity of research regarding application of the PrOACT model of innovation decision-making. In practical terms, the research can provide guidance to managers of small enterprises, especially teams in the IT industry. Managers of such companies should approach the decision-

making process systematically, adequately considering the perceptions and interpretations of various stakeholders, as well as the significance of each of the alternatives considered. The PrOACT model enables managers to thoughtfully and cautiously manage the innovation implementation process, which is a very stressful period for any organization as it signifies a unique transition. Only such a decision on innovations, which is thoroughly elaborated and planned beforehand, can lead to progress in the company. The PrOACT model can assist managers in quantifying the outcomes of various alternatives, enabling them to assess their value more objectively and make rational decisions. Also, ProACT model helps a decision-maker understand the degree to which he is willing to face less favorable consequences in pursuit of a better outcome. Understanding one's own readiness to accept risk can help choosing alternatives.

Limitations of the conducted research relate to the use of only a case study, which represents a qualitative method of data analysis, making the conclusions drawn in the paper non-generalizable. Similarly, the research was conducted on the example of one company, so certain implications cannot be transferred to companies with a larger number of employees or companies from other sectors. Nevertheless, guidelines for future research involve a detailed analysis of innovation decision-making factors using the PrOACT model, especially since this method encourages management to conduct a comprehensive and detailed analysis of the company's position. In this way, the definition of specific, measurable, achievable, relevant, and time-bound goals makes their realization easier. Additionally, future research could involve a multiple case study or empirical research related to the application of the PrOACT model, involving a sample of a larger number of companies.

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