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PROCESS INNOVATION AS A RESULT OF CRM MECHANISMS

Abstract: This paper aims to examine the impact of different cooperation mechanisms with customers on the development of process innovation in companies in AP Vojvodina in the Republic of Serbia. Customer collaboration mechanisms include information sharing with customers, joint problem solving with customers, and technology used in customer relationships. In the software package for statistical data analysis Smart PLS 4, a statistical analysis of the data obtained by conducting a questionnaire in companies in AP Vojvodina was performed. The sample includes 31 companies, and its owners or general managers were responsible for filling it out. The results showed that joint problem solving with customers and the application of technology in relations with them significantly and positively affects the development of process innovations. In addition, information sharing with customers also has a positive impact on process innovation, but it is not statistically significant.

Keywords: Innovation, process innovation, CRM.

1. INTRODUCTION

The business environment focuses more and more on innovations because they are an important factor for increasing competitiveness and achieving a competitive advantage. Innovation failure rates are very high and create high costs for companies (Lukes & Stephan, 2017). Therefore, it is important to understand the factors that influence or enhance innovation activities in the business environment. Customers are a key actor for companies who can provide them with information or participate with them in the joint creation of new products. Co-development, which is aligned with customer needs, will increase satisfaction, and ensure a higher likelihood of adoption of their innovations (Henard & Szymanski, 2001). The main issue in the innovation process is the effective management of customer knowledge, which includes the collection, sharing, transfer, efficient use, adaptation, and use of the same information in activities that are significant for customers. The inclusion of customers in business processes means that they become a resource of the company, which it serves to enhance its innovative capabilities (Vargo & Lusch, 2004). It is very important that the management of the company knows and understands the conditions under which cooperation with customers will lead to successful innovation. The focus of our research will be various mechanisms of cooperation with customers and their impact on process innovation. The structure of the work includes primarily a review of the literature in process innovations and cooperation with customers. Cooperation mechanisms that may be relevant for process innovation are also discussed. They include sharing information with customers, collaborative problem solving, and technology used in customer relationships. Empirical research was conducted on the territory of AP Vojvodina in the Republic of Serbia. The sample consists of companies in this area, and their general managers were responsible for filling out the survey. After that, a statistical analysis was performed, the results and conclusions were presented.

2. THEORETICAL BACKGROUND

The success of many companies is most often attributed to the innovations they brought with them. In modern business conditions, innovative activities have become a necessity that ensures companies' survival. They are faced with a great

need to stay ahead of global changes, pressure to produce quick results and fierce competition that is aggressively marching towards its innovative future. In addition to maintaining a competitive advantage, it is important to highlight the importance of innovation for generating economic growth (Schumpeter & Swedberg, 2021). Innovative potential needs to be used in all fields. Innovations mean the creation and implementation of ideas into new products, processes, or services, which, with their uniqueness, bring high value to those who apply them (Kamal et al. 2023).

Explaining innovations requires distinguishing them and introducing different categories of innovations. The basic division of innovations was made according to the nature and degree of changes they bring. Based on this, we have radical and incremental innovations (Dewar & Dutton, 1986). Radical innovations are obtained through significant research and experimentation, and their result is unprecedented knowledge, products and processes, whose return on investment requires a long period of time (Duodu & Rowlinson, 2021). Incremental innovations imply changes and improvement of existing products, services, processes, technologies, organizational structure, and other organizational components (de Vries & Verhagen, 2016). Depending on the nature of the innovation itself, there are different forms. In the literature, we most often encounter product and service innovations, process innovations, and organizational innovations (Goffin & Mitchell, 2016; Rahmah et al., 2020). Product innovations mean the development of new or improvement of existing products. Process innovation means the creation of new and improvement of existing processes in the company. Administrative innovations represent the introduction of novelties into the organization, which affect changes in procedures, rules, organizational structure, roles, and relationships in the organization (Naveh et al., 2006). Many researchers are interested in the relationship between product innovation and process innovation (Fritsch & Meschede, 2001; Li et al., 2007; Bergfors & Larsson, 2009). Weiss (2003) concludes that companies will favor product innovation when there is strong competitive influence and for products that have a high level of differentiation, while process innovation will be favored for less differentiated products and weaker competitive influence. Abernathy & Utterback (1978) presented a model that shows the relationship between product innovation and process innovation through the product life cycle. In the earlier stages of the life cycle, there is the greatest potential for innovation of the product itself, so product innovation is more dominant. Improvements and improvements to the product throughout its life cycle led to exhaustion of product innovation. Then the focus shifts to process innovation. Process innovation is explained as the ability of an organization to provide a better work process than the current one, thereby achieving better performance (Lei & Le, 2021). They represent the redesign of business processes, using innovative technologies and available organizational resources (Davenport, 1993). Process innovation is the most important way that enables companies to be more efficient and reduce their operating costs (Yan et al., 2024). Their potential is also reflected in the fact that they can contribute to quality improvement, ensure organizational flexibility, improve service delivery, and contribute to the achievement of organizational goals. Process innovation can come from various internal and external sources (Reichstein & Salter, 2006). In further considerations, attention will be focused on customers, as an external source of information for process innovation. Davenport (1993) points out that in addition to the competitive influence on process innovation, the incentive provided by customers is very important. Adequate customer relationship management enables customer retention and obtaining suggestions for improving products and services (Ramani & Kumar, 2008). Unsatisfied customer needs and frustrations are a valuable source of innovation. They possess unique knowledge about their preferences (Poetz & Schreier, 2012). Therefore, cooperation with them is the right way to reach innovation (Prahalad & Ramaswamy, 2004). The choice of customers for cooperation, who will provide innovative and profitable products, requires that they be representatives of that market, that is, that they face the needs of most of that market (Morrison et al., 2004). It is important to explain how and where companies should involve their consumers, to gain a better insight into them (Bratianu et al., 2023). Achieving the necessary knowledge requires the development of various cooperation mechanisms that will improve knowledge flows, facilitate cooperation, and spread innovative culture (Massingham, 2020). CRM (customer relationship management) is the use of comprehensive strategies and engineering to find, understand, acquire, and retain customers (Claycomb et al., 1999). This approach includes the activities of satisfying customers' needs, identifying their preferences, resolving complaints, providing after-sales services, and establishing long-term relationships (Sin et al., 2005). This study examines the impact on process innovation of three CRM activities, namely information sharing, collaborative problem solving, and technology-based CRM.

2.1. Information sharing

Information sharing refers to the degree to which stakeholders are willing to share information with each other and thereby facilitate mutual business (Kulangara et al., 2016). It represents the interactive activities of the company and the customer through which they exchange and share information about preferences, market demand, new product introductions and sales promotion (Mentzer et al., 2000). Information exchange is a good signal to partners that there is knowledge that is of potential value to them (Husted & Michailova, 2010). There is no guarantee that every form of collaboration will contribute to innovative performance (Wang & Hu, 2020). Therefore, it is necessary to view knowledge management as a dynamic process that requires constant work and adaptation, removing the gap identified between customer expectations and aligning with customer beliefs (Bratianu, C., & Vasilache, S. (2009). Customers need to be provided with adequate feedback (Ma Prieto & Pilar Perez-Santana, 2014). Both companies and customers can benefit from sharing information (Subramaniam & Youndt, 2005; Mooi & Frambach, 2012). If information reflects the customer's current and future needs, it contributes to the innovation process (Cui & Wu, 2018). Firms improve their

innovation capacity when they increase the scope of their relationships with others is a mechanism that turns tacit knowledge into explicit knowledge, and both types of knowledge are inputs for achieving innovation (Castaneda & Cuellar, 2020). The idea is to stimulate customers to make their experience and imagination available to the company, thus becoming active partners in to the process of joint creation (Bratianu et al., 2023). Wang & Hu (2020) explained the relationship between process innovation and information sharing in the way that information sharing enables practitioners to learn. They are thus trained to solve technical problems, get new ideas, set new goals, and create new tools. They believe that sharing knowledge based on mutual trust and respect will bring long-term benefits, such as innovation and profit. The first hypothesis H1 is based on the previous analyses.

H1: Information sharing has a positive and statistically significant impact on process innovation in companies in the AP Vojvodina area in the Republic of Serbia.

2.2. Joint problem-solving

Joint problem solving involves a difficult or unforeseen situation in which the company and the customer share responsibility and solve the problem together (McEvily & Marcus, 2005). Providing voluntary assistance to customers to solve problems in product design or technological process helps the company to improve product quality and improve business processes (Walter & Ritter, 2003). Those who have developed mechanisms for joint problem solving are in a better position in terms of realizing complaints, providing after-sales services, resolving customer claims and maintenance. Collaborative problem solving contributes to innovation performance because it brings about continuous improvements in products, processes, and services (Huang & Chang, 2008). This way of solving problems is doubly important for organizational innovation (Wang & Hu, 2020). First, when solving problems together, partners provide significant savings in time and investment, which are required for information gathering. Second, this process provides learning for the parties involved. New opportunities and new knowledge are often born from it. By solving problems together, customers can be significantly influenced. Acquaintance with specific problems and joint search for a solution can lead to changes in consumer habits and their procedural adjustments. This is especially characteristic of complex products where there are many restrictions and few possibilities for change. Customers will much more easily accept solutions that are not perfect and in line with their expectations when they are involved in solving the problems that the company is facing. The second hypothesis H2 is based on the previous consideration:

H2: Joint problem solving with customers has a positive and statistically significant impact on process innovation in companies in the AP Vojvodina area in the Republic of Serbia.

2.3. Technology based CRM

CRM-based technologies involve the use of IT systems to offer customers technological assistance and facilitate the establishment of relationships with them. This collaboration mechanism should facilitate customer communication and understanding. Thus, the conditions are created for a faster and easier response to their needs. CRM-based technology provides data that serves to improve services and achieve customer loyalty (Ferreira et al., 2023). Today, this is very pronounced when we have the use of artificial intelligence in CRM in full swing. Kumar et al. (2023) points out that companies are developing systems that are integrated with artificial intelligence to accurately manage complex relationships and analyse customer requirements. CRM is a key tool that digitizes the business world and has a great capacity for the development of innovation (Gil-Gomez et al., 2020). When it comes to the importance of using CRM for process innovation, Wang & Hu (2020) showed that companies using CRM technologies initiate changes in production technology faster and adhere to customer specifications. The significant role of IT systems for process innovation was recognized by Valmohammadi (2017), Khosrow-Pour (2006), Tarafdar and Gordon (2007). Their considerations suggest that the use of technology in customer relations will increase the number of process innovations. This leads to the establishment of the third hypothesis H3:

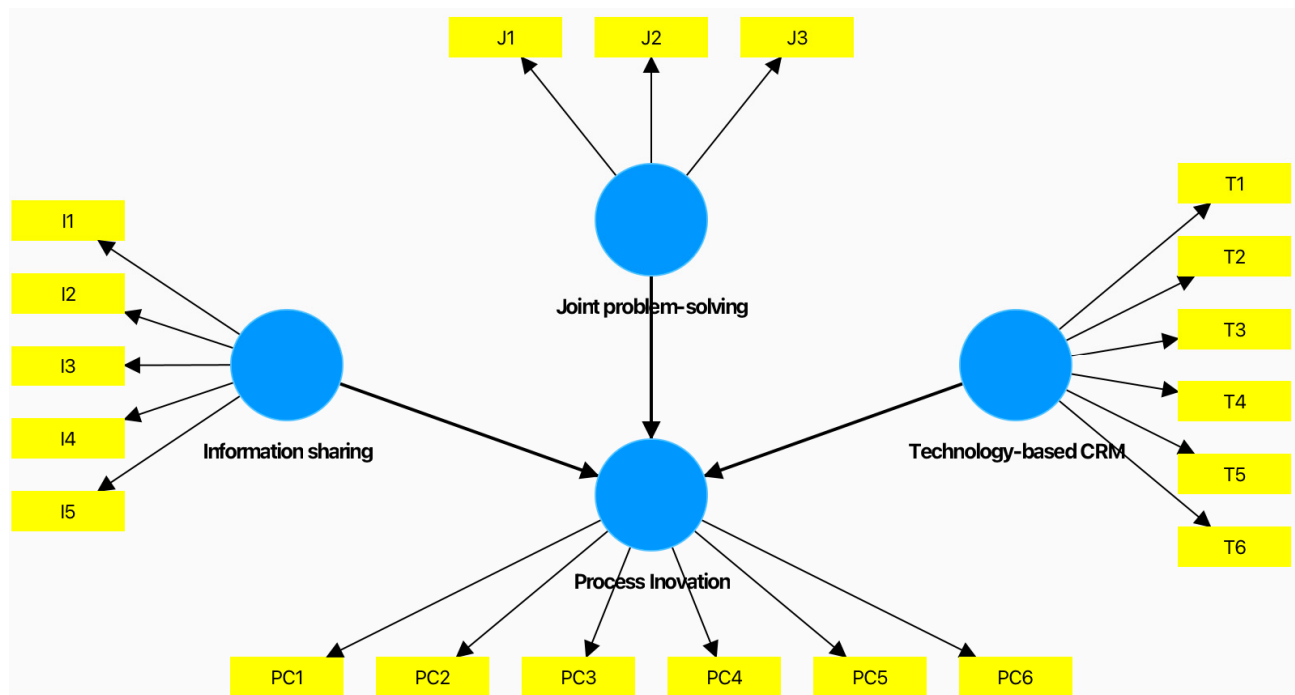
H3: Technology based CRM: with customers has a positive and statistically significant impact on process innovation in companies in the AP Vojvodina area in the Republic of Serbia.

3. METHODOLOGY

The research methodology was carried out through several steps. It meant primarily defining the constructs and specifying their relationship. The database, which was used for the analysis, was obtained through research conducted on companies in the territory of AP Vojvodina in the Republic of Serbia. The idea is to examine the impact of different forms of relationship with consumers on process innovation. The research is based on a questionnaire created by Ru-Jen Lin et al. (2010). The observed dimensions of consumer relations are information sharing with consumers, joint problem solving with consumers, and the use of technology in consumer relations. Information sharing included the following indicators: *I1. Our company shares market information with customers (promotional information and competitive product information); I2. Our company shares product demand information with customers; I3. Our company shares inventory information with customers; I4. Our company jointly makes production plans with*

customers; I5. Our customers alert us to events that may affect our supply. The construct denoting joint problem solving involves the following questions: J1. Our key customers work with us to overcome difficulties (inventory management, delivery delays and logistics management); J2. Our company is jointly responsible with our key customers for getting things done; J3. Our company works with our key customers to help solve each other's problems (financing, production, and management). Indicators for technology used in customer relations are as follows: T1. Our company uses a call center or computerized telephone integration to deal with customer requests, complaints, and suggestions; T2. Our company uses SFA (Sales Force Automation) to monitor sales processes, analyze customer trade-offs, find information, find problems, and help negotiate and adjust business; T3. Our company uses MIS to collect information on customer trade-offs and to integrate the database; T4. Our company has constructed an integrated CRM performance evaluation system; T5. Our company establishes a perfect web-based customer interaction; T6. Our company uses data warehousing and data mining to store customer information to identify which potential customers are more valuable. 31 companies on the territory of AP Vojvodina were included in the research. The companies in the sample come from different business sectors. When looking at the number of employees, eighteen companies have up to 50 employees, while the remaining thirteen companies have over 50 employees. Fifteen companies have been around for over twenty years, while the other sixteen are younger. Based on this, it can be concluded that a balance has been made regarding the number of employees, age of the company and business sectors.

The model was analyzed using the Smart PLS 14 software tool. The conceptual model is shown in Figure 1.



Picture 1: Conceptual model
Source: Authors, 2024

4. RESULTS

Estimates of constructs for the main model were performed by examining the reliability of individual indicators, reliability of internal consistency, convergent validity and discriminant validity.

The reliability of the indicators was checked by evaluating the standardized loadings of the indicators. Only I1 and PC1 did not have a higher value than 0.7. Therefore, they were excluded from further analysis. Other values were greater than 0.7 for all indicators, which satisfied the reliability of the indicators. For internal consistency reliability and convergent validity, all reflective constructs had satisfactory levels of composite reliability (Cronbac'h alpha) above 0.7 and AVE above 0.5. Below is a table showing the quality of the reflective construction.

Table 2: Quality criteria of reflective constructs

Constructs	Outer loadings	AVE	Cronbac'h alpha
Information sharing		0.682	0.848
I2	0.764		
I3	0.851		
I4	0.776		
I5	0.906		

Joint-problem solving		0.620	0.853
J1	0.879		
J2	0.725		
J3	0.745		
Technology based CRM		0.691	0.910
T1	0.783		
T2	0.823		
T3	0.802		
T4	0.916		
T5	0.822		
T6	0.836		
Process innovation		0.618	0.692
PC2	0.854		
PC3	0.785		
PC4	0.785		
PC5	0.717		
PC6	0.790		

Source: Authors, 2024.

The results of the discriminant validity test are shown in the following table. When it comes to discriminant validity, the Fornell-Larcker and Heterotrait-monotrait ratio (HTMT) criteria were established. Discriminant validity was considered from the aspect of Heterotrait-monotrait ratio (HTMT) criteria. From the attached table, it can be seen that the condition of discriminant validity is met.

Table 3: Discriminant validity - Heterotrait - monotrait ratio (HTMT)

Information sharing	Information sharing	Process innovation	Technology based CRM	Joint-problem solving
Process innovation	0.388			
Technology based CRM	0.200	0.637		
Joint-problem solving	0.619	0.568	0.130	

Source: Authors, 2024.

A bootstrapping procedure with 5000 subsamples was used to examine the path coefficients. As seen in Table 4, all path coefficients were positive and statistically significant at $p < 0.05$, with VIF values below 3 indicating no collinearity issues.

Table 4: Path coefficients and VIF values

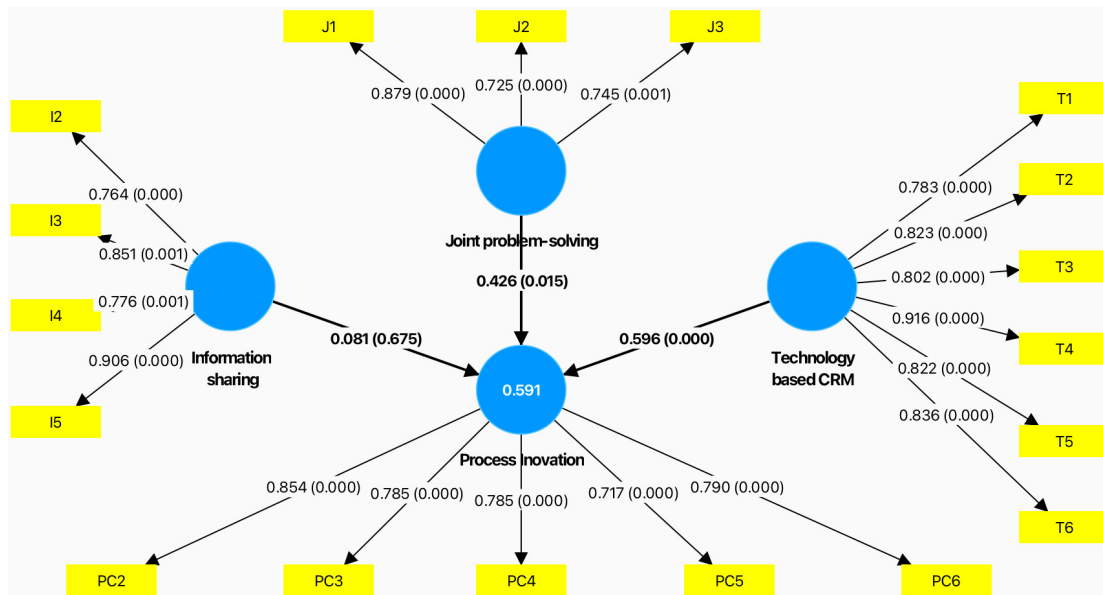
	Path coefficients	Standard deviation	T statistics	P values	VIF
Information sharing -> Process innovation	0,081	0,193	0,419	0,675	1,354
Technology based CRM -> Process innovation	0,596	0,105	5,651	0,000	1,048
Joint-problem solving -> Process innovation	0,426	0,175	2,440	0,015	1,308

Source: Authors, 2024.

Bearing in mind all the previous comments, it can be emphasized that it has been proven that the instrument can be used in the analysis, when it comes to testing the main model of this research.

The coefficients for PLS-SEM relationships, their level of significance and the R2 value are shown in Figure 1. The value of R2 is 0.591, which means that 59.1% of the variance of process innovation is explained by lower-level constructs. The coefficients representing the relationships between lower-level reflective constructs and process innovation are positive and statistically significant with $p < 0.05$, for joint problem solving (0.015) and for technology (0.002).

When it comes to the impact of information sharing on process innovation, the coefficient was (0.675) with $p < 0.01$, which means that it is a positive relationship that is not statistically significant.



Picture 2: PLS-SEM relations
 Source: Authors, 2024

5. DISCUSSION AND CONCLUSION

Innovations are essential to achieving a competitive advantage because they provide companies with flexibility that helps them adapt to change more easily. Process innovations represent procedural changes in production, to achieve better results and improve products and services for customers. Companies often rely on customers as sources to enhance their innovative potential. Our research aimed to determine how cooperation with customers affects process innovation. Cooperation with customers refers to various mechanisms through which it can be implemented. These include information sharing with customers, joint problem solving and technology-based CRM. Based on the obtained results, information sharing has a positive effect on process innovation, but that this relationship is not statistically significant. This means that hypothesis H1 is not confirmed. This result does not support the consulted literature on this topic. Carr & Pearson (1999) point out that information sharing will lead to the adoption of new technologies by manufacturers, which will affect design and business processes. Lin et al. (2010) says that there is a positive effect of information sharing on product and process innovation. We look for the explanation of such results in several places. We primarily focus on the sample and the area where the research is conducted. In this area, the awareness of the benefits of open innovation and cooperation with external actors on the market is not yet sufficiently pronounced. Disclosure and sharing of important information are not characteristic of these companies, due to the fear that the competition will not get to them. In addition, we seek justification in the nature of the innovations, which were chosen to be observed in relation to cooperation. Since it is about process innovation, we start from the fact that customers are not sufficiently ready and expert to suggest and provide useful information, which could lead the company to innovation in the process itself. Hypotheses H2 and H3 were fully confirmed. When we talk about joint problem solving, it is concluded that it increases the probability of process innovation. Huang & Chang (2008) and Wang & Hu (2020) reach the same conclusions. Unlike information sharing, joint problem solving represents a higher degree of cooperation. First, joint resolution tells us that it is a joint business that is often formalized with certain documentation and for which there is a certain interest of both parties. Based on that, the responsibility of interested parties is greater, and therefore the willingness and freedom to disclose confidential information. In the end, joint solving implies that all actors are familiar with the technological process, understand the position of the company and the problems it faces. Therefore, process innovation is much more likely to occur within a joint problem-solving process because the parties are contractually secured, bound, accountable and familiar with all the details of the technological process. Technology-based CRM has proven to be a mechanism that increases the likelihood of increasing process innovation in companies. Agreement with these findings is found in many works (Gil-Gomez et al., 2020; Wang & Hu 2020; Valmohammadi, 2017; Khosrow-Pour, 2006; Tarafdar & Gordon, 2007). This technology enables the creation of significant databases, which can be a source of diverse information for all segments of the company. It is only important to find an adequate application of that data.

The practical application of the results of this research can be seen in situations where companies want to influence their innovation activity. Important mechanisms are presented and their importance for process innovations is explained. The contribution can also be seen through the increase of literature in the field of innovation and marketing and can serve as a landmark for subsequent research. The limitation of the work that can be cited as the most important is the size of the sample itself, followed by the fact that the respondents come from different sectors, which is not very useful when using a small sample. Another limitation is that not all customer cooperation mechanisms are covered.

Recommendations for further research are as follows. First, it is necessary to increase the sample and perform the analysis according to sectors. Inclusion of other mechanisms that make up the relational context. In addition, it would be good to look at the impact of customer relations on other types of innovation.

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