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INNOVATION CAPABILITY AS KEY TO COMPETITIVE ADVANTAGE: RELATION OF PRODUCT INNOVATION CAPABILITY, PROCESS INNOVATION CAPABILITY, AND FIRM PERFORMANCE

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Abstract:
In the technological products and services market, which operates under rapidly changing market conditions and where competition is intense, firms need to offer well-developed innovative products and services to the market in order to maintain their existence in the long term. However, firms need to have a range of internal capabilities to produce these innovative products and services. The key for firms to keep up with the intense competitive environment and to achieve the firm performance, which is the ultimate goal of each firm, is possible with the presence of product innovation capability and process innovation capability, which are the two sub-dimensions of innovation capability. In our study, the relationships between product innovation capability and process innovation capability, which are the two sub-dimensions of innovation capability, and firm performance were examined. The combination of product and process innovation capability plays a critical role in the success of firms. At this point, the complementary feature that exists between both abilities gains importance. The research was conducted with 220 questionnaires collected from the middle/senior managers of 120 firms operating in the field of technology. The data were analyzed by partial least squares method in SmartPls4 program. The results reveal that product innovation capability and process innovation capability have a positive impact on firms' performance.

Keywords:
Process Innovation capability, Product Innovation Capability Firm Performance, SmartPLS4

1. Introduction
Technology firms need to produce products and services that require intense innovative resources and expertise in the competitive market conditions in which they operate. Developing new products and services is an expensive and risky process for firms. For this reason, firms operating in global market conditions and intense competition have to be aware of the importance of developing new products and responding to market demands as soon as possible in order to survive, be successful and provide a sustainable competitive advantage in the long run. Brown and Eisenhardt, 1995). Product innovation capabilities and process innovation capabilities that firms must have to realize these processes are important internal capabilities. Most academics see innovation as a goal for firms to gain competitive advantage and sustain growth. For this reason, it is seen that there is an increasing trend in innovation and innovation capabilities in the management and industrial economics literature (Chen, 2004). On the other hand, firms' innovation capability (product innovation capability and process innovation capability) is considered one of the most important internal resources that can result in superior firm performance (Perna, Baraldi, & Waluszewski, 2015). Without such internal capabilities, it is not possible for a firm to respond to rapidly changing market conditions (Najafi, Tavani, 2018).
The basis of the study is based on resource-based theory. The resource-based theory says that firms with valuable, rare, imitable and non-substitute goods and services will provide a competitive advantage and will continue to exist in the long term. Theoretically, it is stated that only firms with certain internal capabilities (i.e. product innovation capability, process innovation capability) can achieve superior performance (Barney, 1991; Hamel and Prahalad, 1994). These abilities are acquired through internal experience and are provided by experimental acquisition.

Innovation capabilities are special and imitable assets of firms (Wang, Ahmed, 2007). Innovation capabilities are at the heart of firms creating value for themselves, storming creative destruction over competitors and driving progress for society. (Brown and Eisenhardt, 1997; Ahuja and Katila, 2001).

2. Literature Review

Drucker (1985) defined innovation as the act of giving talent and resources the capacity to create wealth. He also stated that innovation and capabilities develop together by creating synergies with each other. Solheim (2017) stated that innovation is the activity of gradual realization of many interrelated innovations that arise as a result of a long-term process. The concept of the ability to innovate was first used by Burns and Stalker (1961) to refer to the ability to successfully align new ideas, products, and processes with internal processes in an organization.

A firm's ability to create a steady stream of innovation may be more important than ever in allowing a firm to develop or maintain a competitive advantage due to increasing levels of competition and declining product lifecycles. In an environment of intense competition, the profits created by any innovation may be temporary (Greenhalgh and Longland, 2005). Conversely, the relatively rapid flow of many innovations over time can enable the firm to continue to generate high levels of profitability (Barczak, 1995; Roberts, 1999). For these reasons, effective management of the innovation process remains a focus for managers and business researchers (Bogner & Bansal, 2007).

The concept of innovation capability has been expressed in different ways by researchers. Lau et al. (2010) defined the concept of innovation capability as the development and implementation of new products and appropriate process technologies that enable a firm to generate long-term profits, meet market needs, and eliminate competitive threats. Lerro et al. (2009) defined innovation capability as the ability to continually transform ideas and information into new systems, processes and products that will benefit firms and their stakeholders. Saunila et al. (2014) expressed the ability to innovate as the innovation potential that firms can realize.

Product innovation is the introduction of a good or service to the market by improving its existing features according to its planned uses (Edquist et al., 2001). product innovation; It is also defined as the introduction of new products to the market by the organization. According to another definition, product innovation is to produce and sell new or better products (Edquist et al., 2001). The primary goal of product innovation is to gain competitive advantage, ensure long-term success, and deliver value to the customer through the commercialization and development of new products and services (Rainey, 2005).

Innovation capability is recognized as a critical organizational capability that enables a firm to effectively allocate resources to create value, and it has been shown to have a positive effect on firms' performance (Yang, C.-C., 2012). In various empirical studies, it is claimed that innovation capability can positively improve the financial performance of firms in areas such as sales growth, profitability and market share (Clayton and Turner 2000, Hult et al. 2004, Tuominen and Hyvönen 2004, Jenssen and Randoy 2006, Panayides 2006).

Product innovation means significantly improving the existing features of a service or good, adding new features suitable for its use, or introducing a new good or service to the market. Product innovations can be realized by utilizing new information and technologies, or by adapting existing knowledge and technology combinations to new areas. Product innovations reflect new options and improvements that businesses incorporate into their product mix. In this type of innovation, the word "product" encompasses both goods and services. (OECD and Eurostat, 2005).

A production process consists of process equipment, material inputs, labor, task specifications, work and information flows, etc., used to produce a product or service (Utterback, Abernathy; 1975). Knighton (2018) defined process innovation as new or significantly improved production, supply chain and production processes and pointed out that process innovation is the source of organizational innovation in the competitive process of the firm. Process innovation is the use of new techniques, methods, materials, input mechanisms, information flow mechanisms and equipment in the production of a product or the delivery of a service (Afuah, 2020).

While product innovation reflects changes in the final product or service offered by the organization, process innovation represents changes in the way organizations produce final products or services (Cooper, 1995). Process innovations are not limited to firms building teams or making acquisitions. It also creates significant changes in business processes and practices. For organizations, process innovation is the replacement of an existing technology or process with a new process or technology that requires significant costs. Incorporating innovation into organizational processes and routines incurs significant costs. This can sometimes lead to higher costs than the initial setup of the business process (Bunduchi, Smart; 2010).

In addition, firms' innovation capabilities (product innovation capability and process innovation capability) are considered one of the most important internal resources that can result in superior firm performance (Perna, Baraldi, & Waluszewski, 2015). Without such internal capabilities, it is not possible for a firm to respond to rapidly changing market conditions (Najafi, Taze, 2018). Firms' capacity to develop and use their innovative capabilities is widely accepted as a critical determinant of firm performance and competitive advantage (Bettis and Hitt, 1995 ; Helfat and Peteraf, 2003; Voss, 1994).

Numerous classifications have been made for types of innovation, but one of the most widely accepted among them is the Organization for Economic Co-operation and Development OECD (2005) classification in the Oslo Manual, which distinguishes four types of innovation. Within this classification, innovation types are grouped under four headings: product innovation, process innovation, organizational innovation and marketing innovation. Considering the activities of firms that exchange technological activities and information in the light of these classifications, it is appropriate to use the technological innovation classification (product and process) in this study.

The capability to innovate is often recognized as an important tool for achieving superior performance in competitive market conditions (Lyon and Ferrier, 2002). The long-term survival of firms and their capability to achieve firm performance depends on their success in the search for technological competitiveness. The pursuit of technological competitiveness, on the other hand, depends on product innovation and productivity based on improving the quality that firms will develop internally (Antonucci, Pianta, 2002).

The prerequisites for increasing the performance of the firm are the introduction of new ideas, their improvement, the reduction of production costs, the introduction of well-designed, developed and implemented innovations (Naala, et al., 2017). There is substantial evidence that innovators perform better than firms that do not innovate (Baldwin and Gellatly 2003; Goudi et al., 2003; Hoffman et al., 1998; Klomp and van Leeuwen 2001; Mansury and Love 2008; Prajogo 2006; Roper et al., 2002).

Firms need to implement a culture of effective innovation within the organization to achieve greater impact on their overall performance. Organizations that implement this type of innovative culture stay ahead of their competitors because these innovations ultimately positively impact other variables such as business performance, marketing performance, and overall financial performance. This helps organizations grow on a larger scale (Alam et al., 2013).

Bayus et al. (2003) showed in their empirical studies that product innovation has a significant positive effect on firm performance. Andries and Czarnitzki (2014), Britton (1989) and De Propris (2002) found in their studies that product innovation ability has a positive effect on firm performance. They found that firms with new product innovation that make big sales with a new product experience an increase in performance. Based on their research on Brazilian firms, Goedhuys and Veugelers (2008) found that "product innovation also translates into superior sales and growth rates".

Abazi-Alili et al. (2017) and Gërguri-Rashiti et al. (2017) found that product innovation has a positive effect on firm performance. Two other studies conducted by Stoevsky (2005) and Roud (2007) in Bulgaria and Russia, respectively, showed a positive relationship between product innovation and firm performance.In this direction, the study puts forward the following hypothesis:

H1: There is a positive and significant relationship between product innovation capability and firm performance.

Literature researchers and existing studies have focused on the fact that process innovation leads to cost reduction and increased production volumes to gain efficiency (Kurkkio et al., 2011; Lim, et al., 2006). In addition, process innovation contributes to reducing development times for products (Pisano, 1996). Process innovation also adds direct value to customers through improved product quality and reliability (Gopalakrishnan et al., 1999).

High-intensity process innovations in the market provide stronger price competition and positively change the demand curve of product innovations with greater demand gap. At the same time, process innovations increase the efficiency of labor and capital and reduce production costs (Smolny, 2003).

Product innovation capabilities and process innovation capabilities have different information characteristics (Kraft, 1990). In high competition conditions, unless newly developed products are protected by patents, competitors can develop and market them rapidly (Kotabe, 1990). However, it is not possible for competitors to imitate process innovations easily. Because process innovations are mostly managed internally (ie it depends more on soft knowledge and people skills). Process innovations are more easily kept secret and less visible to competitors (Kotabe, 1990; Kraft, 1990; Zahra, 1993). A firm that currently dominates the market does not have much to gain from its competitors. Therefore, while firms will make little profit by introducing new products, they can save more costs from any process innovation they see fit (Scherer, 1983). This has a positive effect on firm performance. In addition,

the empirical findings obtained in the study by Tajeddin, K. (2016) revealed that process innovation is an important determinant of firms' business performance.
Process innovation also adds direct value to customers through improved product quality and reliability (Gopalakrishnan, et al., 1999). This also leads to productivity gains. These different results provide a positive effect on a firm's competitive structure (Frishammar, et al.; 2012).In this direction, the study puts forward the following hypothesis:
H2: There is a positive and significant relationship between process innovation ability and firm performance.

3. Methodology

Research Model and Hypotheses
The aim of the study is to reveal that firms' innovation ability (process innovation and product innovation) creates on firm performance, which is the ultimate goal of each firm. The model created to examine the relationship between process innovation capability and product innovation capability is given in Figure 1.

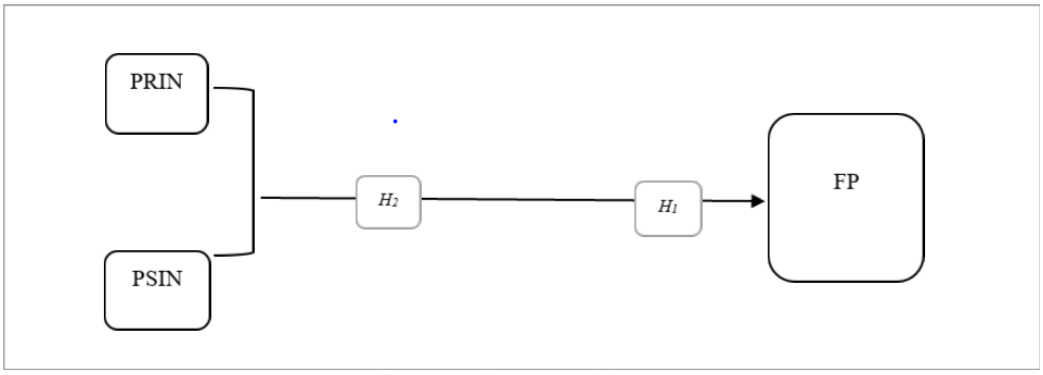

Figure 1: Research Model

In order to examine the relationships between the variables in Figure 1, the hypotheses of the research were formed as follows::
H1: There is a positive and significant relationship between product innovation capability and firm performance.
H2: There is a positive and significant relationship between process innovation capability and firm performance.
Data Collection Tool and Data Set

In order to test the hypotheses proposed in the research, research scales published in Social Sciences Citation Index (SSCI) indexed journals were used. The prepared questionnaire consists of three parts and 33 questions. In the first part of the questionnaire, there are statements about firm performance, in the second part product innovation capability, and in the third part, there are statements about process innovation capability. The questionnaires were shared with the lower/middle and senior managers of the firms operating in the field of technology and 220 questionnaires were obtained. A 5-point Likert scale was used to evaluate the research structures and the participants were allowed to respond with an ordinal scale with the options (1) Strongly Disagree, (2) Disagree, (3) Undecided, (4) Agree, and (5) Strongly Agree.
The data collected in the study, which was carried out with a total of 220 participants, were subjected to path analysis with the Partial Least Squares Structural Equation Model (PLS-SEM) and the results were interpreted. Firstly, confirmatory factor analysis, validity analysis and path analysis were performed using the SmartPLS 4.0 Structural Equation Model (SEM) statistical package program.

First of all, Outer Loading values are examined for validity. While this value above 0.60 is sufficient for factor analysis, the acceptance value for the SmartPLS program is 0.708 (Hair et al., 2007). When the relevant column of the table is examined, it is seen that all values are above 0.708. Cronbach's Alpha, rho_A and Composite Realiability

values are examined for the internal consistency reliability of the model. For convergent validity, Average Variance extracted (AVE) values are examined.

Cronbach's Alpha values and reliability coefficients are checked, and the Cronbach's alpha value must be higher than 0.50 in order to meet the internal consistency criterion (Hair et al., 2007). All Cronbach's Alpha values were above 0.50. It is sufficient that the rho_A coefficients, which show whether the indicators in the factors are reliable or not, have a value above 0.70 (Dijksra & Henseler; 2015). The values found above 0.70 indicate that the indicators are reliable. The reference value to be provided for the composite reliability values is 0'70. The fact that all of these values are above 0'70 indicates the structural suitability of the model.

If the concordance validity (AVE) values provide a value above 0'50 for each variable, it shows that the model has concordance validity. According to the values in Table 1, this condition is fulfilled (Hair et al., 2017, Henseler et al., 2016). The fact that the values in Table 1 are above 0.50 indicates that the concordance validity is provided.

R Square value expresses how much the variables explain the change in each other, and an R Square coefficient of 0.25-0.50 is considered a weak explanation, 0.50-0.75 is considered a medium, and above 0.75 a strong explanation ratio (Hair et al., 2011, Henseler 2009). The values obtained from the analysis above 0.75 indicate a strong level of explanation.

Table 1: Values Table of Factors

Latent Variable	Indıcators	Outher Loadings	Cronbach's Alpha	Rho'A	Composite Reliability	(AVE)	R Square	T Statis.
PRIN	PRIN 1	0.885	0.934	0.926	0,925	0,712		51.034
	PRIN 2	0.890						47.613
	PRIN 3	0.907						61.784
	PRIN 4	0.878						55.938
	PRIN 5	0.890						62.138
PSIN	PSIN 10	0.875	0.970	0.926	0,960	0,749		50.986
	PSIN 11	0.899						67.324
	PSIN 2	0.784						24.053
	PSIN 4	0.865						46.927
	PSIN 5	0.891						51.284
	PSIN 6	0.897						59.623
	PSIN 8	0.914						74.534
	PSIN 9	0.897						65.256
FP	FP1	0.777	0.967	0.967	0,965	0,696	0,807	30.521
	FP10	0.844						45.764
	FP11	0.887						68.594
	FP12	0.835						45.104
	FP13	0.840						42.585
	FP2	0.828						30.492
	FP3	0.856						35.028
	FP4	0.788						55.581
	FP5	0.847						57.429
	FP7	0.818						37.214
	FP8	0.842						65.834
	FP9	0.847						45.871

Studies have shown that discriminant validity (Dicriminant Validity) is insufficient to represent discriminant validity to a large extent due to the low sensitivity of considering the Fornell-Larcker criterion, which are two standard approaches in the literature, and the evaluation of cross-loadings (Henseler et al., 2015).

There are three approaches to discriminant validity in the literature. Two of these are the Fornell-Larcker criterion and the evaluation of cross-loading. However, due to the low sensitivity of the evaluation of these two criteria, they were largely insufficient to represent discriminant validity (Henseler et al., 2015).
The third criterion in the literature for discriminant validity is the Heterotrait-Monotrait Ratio (HTMT) criterion. This criterion effectively defines the lack of discriminant validity with high sensitivity rates (Henseler, Ringle, Sarstedt, 2014). According to this definition, HTMT values should be below 0.90 (Henseler et al., 2015). The values related to the HTMT criteria reached in the light of the tests performed are summarized in Table 2.

Table 2: HTMT Criteria Results

	FP	PSIN	PRIN
FP	0.879		
PSIN	0.826	0.832	
PRIN	0.885	0.818	0.898

As can be seen in Table 2, it is seen that discriminant validity is provided because all HTMT values obtained in the analysis are 0.90.

Table 3: Path Coefficients

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	TStatistics	P Values
PSIN -> FP	0.509	0,545	0.097	5.220	0.000
PRIN-> FP	0.183	0,302	0.079	2.375	0.018

In Table 3, t-test values showing whether the indicators are significant in explaining the variables individually are given.
The results of the structural model evaluation obtained in the analysis made through the SmartPLS program are given in Figure 1. A t-test value greater than 1.96 at a significance level of 0.05 indicates that the indicator is significant (Dülgeroğlu & Başol, 2017). According to the results of the relationship analysis, it was determined that the relationship between process innovation ability and firm performance (β; 0.509, t; 5.220 p; 0.000) was positively significant, and H1 hypothesis was supported in this direction. Again, according to the results of the analysis, product innovation ability and firm performance (β; 0.183, t; 2.375 p; 0.018) were observed and H2 hypothesis was supported accordingly.

5. Conclusion

We suggest that firms should develop their product innovation capability and process innovation capability in order to adapt to the innovative developments taking place in rapidly changing market conditions. Thanks to these capabilities, firms can catch developments outside their own organizations and adapt them to their own internal processes. Managers should create an innovative organizational culture in order to realize successful innovation processes within the firm and provide motivation and training to employees in this direction.
A firm's ability to develop new products and processes is crucial to its success in today's highly competitive business environment. Acquiring innovation capabilities has become an important strategic goal for organizations that want to increase their performance and maintain their competitive advantage. However, acquiring innovation skills is no easy task. It requires significant investment in research and development, as well as the recruitment of highly skilled professionals who can drive innovation. Also, innovation is not a one-time event, but a continuous process that requires constant attention and investment. Firms must continually strive to improve their innovation capabilities and stay ahead of the curve to maintain their competitive advantage. This can be achieved in a variety of ways, including partnering with universities and research institutions, investing in employee training and development

programs, and fostering a culture of innovation within the organisation. By taking these steps, firms can increase their performance, attract top talent, and remain competitive in the ever-changing business environment.

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