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YENİLİK STRATEJİSİNİN UYGULANMASINDA REKABET YOĞUNLUĞU VE TEKNOLOJİK İŞBİRLİĞİNİN ETKİLERİ

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ÖZET

Son yarım asır işletmelerin birbirleri ile yenilik ve buluşlar üzerinden rekabet ettiği bir dönem olmuştur. Daha fazla buluş ve yenilik yapan işletmeler rakiplerinin önüne geçmiş, yapamayanlar ya rekabette çok geride kalmış ya da yok olmuştur. Bu açıdan rekabet stratejileri arasında önemli bir yer bulan yenilik stratejisi işletmelerin başarısında önemli bir yere sahiptir. Bu nedenle yenilik stratejisinin uygulanmasında başarı faktörlerinin anlaşılması her geçen gün daha da önem kazanmaktadır. Bu noktadan hareketle tasarlanan çalışmada işletmelerin yenilik stratejilerini uygulamalarında yenilik kaynağı olan teknolojik iş birliğinin ve rekabet yoğunluğunun etkilerinin incelenmesi amaçlanmıştır. Çalışmada İstanbul, Ankara, Bursa ve Kocaeli illerindeki üretim işletmelerinde görev alan 268 yöneticiden anket yardımı ile toplanan verilerin kısmı en küçük kareli yapısal eşitlik analizi ile incelenmesinden elde edilen bulgulara yer verilmektedir. Yapılan analizlerden elde edilen bulgulara göre rekabet yoğunluğu yenilik stratejilerinin uygulanmasını artıran önemli bir belirleyicidir. Ayrıca artan rekabet yoğunluğu firmaları teknolojik iş birliğine yöneltmekte ve iş birliği düzeyini artırmaktadır. Teknolojik iş birliği düzeyi artan firmaların yenilik stratejilerini uygulama düzeyinin de arttığı gözlenmiştir. Çalışmada ayrıca teknolojik iş birliğinin rekabet yoğunluğu ile yenilik stratejisi uygulama düzeyi arasındaki ilişkide pozitif düzenleyici bir etkisinin de olduğu gözlenmiştir.

Anahtar Kelimeler: REKABET YOĞUNLUĞU, YENİLİK STRATEJİSİ, TEKNOLOJİK İŞ BİRLİĞİ, REKABET STRATEJİSİ, STRATEJİK YÖNETİM.

Jel Kodları: M10, M19, O32

THE EFFECTS OF COMPETITION INTENSITY AND TECHNOLOGICAL COLLABORATION IN IMPLEMENTATION OF INNOVATION STRATEGY[1]

Abstract

The last half century has been a period in which businesses compete with each other through innovations and inventions. Businesses that make more inventions and innovations can get ahead of their competitors, while those that could not were either left far behind in the competition or disappeared. In this respect, innovation strategy, which has an important place among competitive strategies, has an important place in the success of businesses. For this reason, understanding the success factors in the implementation of the innovation strategy is gaining more and more importance every day. In this study, designed from this point of view, it is aimed to examine the effects of technological collaboration, which is a source of innovation, and the intensity of competition in the implementation of innovation strategies of enterprises. In the study, the findings obtained from the analysis of the least square structural equation analysis of the data collected with the help of questionnaires from 268 managers working in production enterprises in the provinces of Istanbul, Ankara, Bursa and Kocaeli are included. According to the findings, the intensity of competition is an important determinant that increases the implementation of innovation strategies. In addition, the increasing intensity of competition leads companies to technological collaboration and increases the level of collaboration. It has been observed that the level of implementation of innovation strategies of companies with an increased level of technological collaboration has also increased. In the study, it was also observed that technological collaboration has a positive moderator effect on the relationship between the intensity of competition and the level of innovation strategy implementation.

Keywords: COMPETITION INTENSITY, INNOVATION STRATEGY, TECHNOLOGICAL COLLABORATION, COMPETITION STRATEGY, STRATEGIC MANAGEMENT.

Jel Codes: M10, M19, O32

[1] [1] This study includes an expanded version of the paper with the same title presented by the authors at the III. International Academician Studies Congress, Change &Adaptation, 13-16.05.2022, Osmaniye, Türkiye.

1. Introduction

Innovation has always been critical to long-term business success. Throughout history, successfully innovated organizations have typically received rewards such as growth, profits, and access to new markets. Continuous innovation has become a critical factor for gaining a competitive advantage. As a result, innovation is now widely accepted as a crucial mechanism for sustainable development for countries and sustainable growth for businesses (Maier, 2020:1).

In business management, innovation has become one of the promising fields of study in explaining the competitive differences between firms. The limited resource problem has made it essential for companies to make strategic decisions that will help them gain a competitive advantage and maintain their competitive edge. Therefore, the strategy formulation process, which has become essential, enables a firm to match its internal resources with the opportunities and risks in its external environment, and environmental dynamism and competitiveness are crucial factors for managers in this process. (Nwachukwu et al., 2019:21).

According to Aktan and Vural (2004), the concept of firm-level competitiveness is at the same level or better than its competitors in terms of factors such as the ability of a firm to produce at a lower cost compared to its competitors, better product quality, more attractive features of the offered products and services compared to competing products. Being in a superior position is defined as the ability to innovate more than its competitors. In this respect, competitive power and the ability of enterprises to innovate are closely related. While competition, in its nature, reduces the firm's expectation of profit, companies must innovate to remain competitive and increase their profits. Schumpeter (1934) argues that competition forces companies to be more innovative, and innovation increases the competitiveness of companies.

In the studies, Resource Based Theory (RBT) is widely used to explain the competitive value of innovation strategies in terms of their impact on business

performance. The theory focuses on internal resources and capabilities to demonstrate the profit and weight of the organization. RBT recognizes that differences in performance occur when one firm has valuable resources that others do not (Wernerfelt, 1984). The assets, capabilities, firm characteristics, knowledge, organizational processes, and similar firm resources that tight controls enable the firm to develop and execute strategies that improve its operations. In terms of performance, effective use of resources in the strategy formulation process can increase the firm's capacity to create and operate new products and services and expand existing and new markets. This may lead to an increase in sales volume. Therefore, the firm's competitive advantage from innovative activities may contribute to performance. Thus, internal and external resources are important corporate strategy and performance factors (Nwachukwu et al., 2019:22).

Another theory developed on the subject is stakeholder theory. Based on this theory in their work, Freeman (1984) state that companies are not only entities that operate for their interests but should also pay attention to stakeholders' interests. According to this situation, which is explained by the stakeholder theory, stakeholders are individuals or groups that can influence and be affected by organizations to achieve specific goals within the influence of organizational activity (Santos and Brito, 2012). The purpose of a firm is to serve as a tool to coordinate stakeholders' interests (Agustia, 2020; Evan and Freeman, 1993).

In this context, companies realize the company's goals with innovation and the results obtained in this way and ensure that the expectations and needs of many stakeholders, especially customers, are met. Companies develop effective strategies to improve their innovation performance, thus meeting and exceeding the expectations of various stakeholders. In this respect, innovation strategy, which has an essential place among competitive strategies, has an important place in the success of businesses.

Innovation is at the forefront of the strategic choices prioritized to get ahead of competitors in sectors with increasing intensity of competition, which generally expresses the degree of competition a company faces in the market in which it operates. However, today's short-term changes in customer demands and shortening of product life cycles force businesses to innovate in much shorter intervals than in the past. However, as a natural consequence of the increasing cost of innovation, technological advancement, and the amount of information produced, it is not advantageous for many businesses to continue this process with only internal resources (Marín-Idárraga and Cuartas-Marín, 2019). For this reason, it has become inevitable for companies to turn to technological collaborations as a source of innovation in the last 20 years. Innovation processes require contact with many stakeholders, especially customers, universities, and research institutions, making this a necessity.

Therefore, making innovation only with internal resources and a closed understanding has been no longer a realistic approach for many businesses. It is difficult to provide the necessary resources for innovation and inventions with the company's help, and it is not rational for many businesses to cope with these problems alone due to the shortening of innovation and design times.

As a result of the developments in this issue in the last half-century, most enterprises adopt models that are open to the outside and cooperate in their innovation processes. It is seen that companies competing with each other cooperate in certain areas. For example, Samsung first signed a license agreement with Microsoft Windows in smartphone software, switched to the Google Android operating system, and joined R&D activities with Nokia and Intel in the open source-based operating system to develop smartphone software (Yun et al., 2016).

This study, designed in this context, examines how the levels of turning to technological collaborations and adopting and implementing innovation strategies

interact depending on the intensity of competition perceived by the enterprises in their market conditions.

2. Conceptual Framework

Competition is expressed as "a situation in which someone is trying to win something or be more successful than someone else." in Cambridge dictionary. Ülgen and Mirze (2013) define competition as businesses that serve the same customer group by offering the same goods or services, fighting each other with strategies that meet customers' needs while responding to their expectations. The intensity of this contention or struggle expresses the intensity of the competition. According to Wu and Pangarkar (2010), the concept of the intensity of competition is defined as the degree of tension imposed by a firm's competitors and activates the firm's strategic response (Ahmetoğulları and Yücel, 2021:18). Yang and Li (2011) argue that when companies compete in the same niche, especially when products and services are homogeneous, competition will be even more robust and will eliminate growth opportunities for companies.

Porter (1985) lists the factors affecting competition in the five forces model that affect competition as follows;

- The intensity of competition between the business and its competitors
- Threat from potential competitors
- Threat of substitute goods
- Bargaining power of suppliers
- Bargaining power of customers

In this classification made by Porter, one of the factors affecting competition is the intensity of competition.

Auh and Menguc (2005) define the intensity of competition as the presence of many competitors in the market, the situation where companies face enormous competitive pressures that result from fierce external competition and affect their development and growth performance.

Porter (1985) summarized the determinants of the intensity of competition as follows: The growth rate of the industry, the share of fixed costs or stock values in added value, non-continuous excess capacity, differences in products, number of unique brands, conversion costs, concentration and balance level, information complexity, diversity of competitors and main objectives of parent companies (Barca and Esen, 2012:93).

As competition in an industry intensifies, customers have more alternatives to meet their needs, and companies face strong pressures for cost-effectiveness and price reduction. This means narrower profit margins (Jaworski and Kohli, 1993; Miller and Friesen, 1983). Under these circumstances, increasing innovation through continuous product, service, and process improvements is required to face competition (Jansen et al., 2006).

According to Zahra (1993), when competition is fierce, the company must carry out product and process innovation together to gain a competitive advantage and, most importantly, open new markets through a differentiation strategy. According to Fritsch and Meschede (2001), product and process innovation are interconnected. Product innovation facilitates process innovation, which increases the possibility of product innovation. However, discussing the relationship between product and process innovation is not particularly new because whether a firm should innovate a process or development may depend on the external environment (Skiver, 2015). In addition, how a firm positions itself in the external environment and which innovation strategies it uses are related to its competitors and competitive environment (Gibb and Haar, 2010).

Today, the key for businesses to cope with the intense competition they experience in many market segments and gain competitive power is their ability to innovate to meet rapidly changing customer demands and needs quickly. Therefore, competitiveness and innovation capacity are closely related.

A competitive environment puts companies under pressure to improve their innovation-related processes to increase production efficiency and not lose their competitive position. Firms that achieve practical process innovation can reduce production costs and increase market share (Sanders Jones and Linderman, 2014). According to Damanpour and Gopalakrishnan (1999), innovation is an organizational activity considered the focal point of strategy, an essential element of resilience, and a source of competitive advantage. As the intensity of competition increases, the firm's freedom to deviate from efficient investment and innovation policies decreases, and switching costs increase (Ayyagari et al., 2011).

Although, the concept of "innovation" is ambiguous because it expresses both a process and its result. It involves transforming an idea into a marketable product or service, be it a new or improved production or distribution process or a new method of social work, according to the definition proposed by the OECD in its "Frascati Guide." Therefore, it expresses a process with its this dimension. On the other hand, when the word "innovation" is used to describe a new or improved product, equipment, or service that is successful in the market, emphasis is placed on the outcome of the process. This ambiguity can lead to confusion: When speaking of innovation diffusion, does it mean the dissemination of the process, i.e., the methods and practices that make innovation possible, or the dissemination of results, i.e., new products? (EC, 1995:4)

In this context, the European Innovation Management Academy defines innovation as "the successful use of a product, service, process, organization or business model that is new for a company, the market or the world" (Doğan, 2016:66). According to Van de Ven (1986), innovation is defined as the development and implementation of new ideas by individuals who, over time, participate in transactions with others in an institutional setting.

In sectors where competition is intense, companies are seen to resort to innovation to prevent technological obsolescence and proactively anticipate changes

in the market. This allows them to enrich their existing processes and expand their product range, improving their market position and earning a higher return on their investment. (Abebe and Angriawan, 2014; Chang et al., 2011).

According to Barsh et al., (2008), innovation, which is the main driving force of the growth of companies, increases its importance depending on the economy's structure, the intensity of competition, and the lack of alternatives to innovative problem-solving. Sirmon et al., (2007) underline that superior returns from innovation are achieved, especially in markets where the intensity of competition is increasing. In this respect, O'cass and Weerawardena (2010) argue that managers need to grasp the intensity of competition in the market to adopt effective changes, such as in-process innovation which ultimately leads to better performance.

Porter (1985) argues that firms in an intensely competitive environment must invest heavily in product innovation to produce unique products or services and gain a competitive advantage. Consistent with Porter's view, Shaw (1982) discovered that in environments with intense competition, firms that engage in product innovation outperform firms that engage in process innovation. In this respect, the concepts of product and process innovation proposed by Schumpeter (1934) increase corporate performance by changing marginal price-cost curves. According to Cohen and Klepper (1996), product innovation improves the customer's purchase intention, while according to Cozarin (2004), process innovation does this by reducing marginal costs. Therefore, these findings show that when the intensity of competition is low, firms should try to improve their production efficiency and economies of scale. As the intensity of competition increases, managers should make great efforts to develop product innovation rather than process innovation to improve the competitive advantages of their businesses (Yang and Yang, 2019).

Innovation is such a complex and uncertain activity that it often requires a combination of inputs from multiple sources. To retain some management control over

these inputs, firms' relationships with external organizations are often formalized in the form of "collaborations." A broad definition of collaboration is used here, which includes any activity in which two or more partners contribute with different resources and knowledge to complementary goals that have been agreed upon. Collaboration between companies can take various forms. Collaboration can be in the form of "R&D contracts" or "technology exchange agreements" that involve the exchange of research findings or technological know-how of the common goals of the companies, or it can be in the form of "innovation networks" in cases where there are many such relations between company groups.

Although collaboration occurs in many different shapes and reflects different motivations, it emerges when it is considered that it will provide mutually positive overall gains in internal activities to the companies that go into collaboration. These achievements can be summarized under three headings (Dodgson, 1994:1-2).

1. Increasing scale and scope of activities: The results of collaboration can be applied to all partners' markets and thus expand the customer bases of individual firms. The synergy between different technological capabilities of firms can produce better and more widely applicable products.
2. Shared cost and risk: Collaboration can share the often very high costs and thus risks of innovation.
3. Increased ability to deal with complexity: Innovation is a way to deal with the complexity of multiple sourcing and technology forms, which are becoming increasingly complex with closer strategic and technological integration between firms.

A competitive environment encourages managers to engage with external stakeholders to develop a comprehensive understanding of available information to expand their firms' adaptability and responsiveness (Alexiev, Volberda, and Van den Bosch, 2016). Firms facing high levels of competition may find themselves less attractive partners, depriving them of opportunities for collaboration to support

growth. While collaboration can reduce competitive effects, it can also hinder firm growth by creating administrative, coordination, and information costs (Singh and Mitchell, 2005). Competition intensity, therefore, interacts with collaboration to affect growth. Thus, the complex relationships between the intensity of competition and technological environments and their impacts on the formation and results of collaboration are areas that need special investigation.

The increasing intensity of competition forces companies to continuously improve their operational performance and production processes to survive (Hallgren and Olhager, 2009). Therefore, companies try to reduce prices by changing and improving their production processes under intense competition. This means that the intensity of competition can affect the relationship between external knowledge-seeking and process innovation.

It is expected situation that enterprises will turn to technological collaborations to increase their innovation performance, especially in sectors where competition is intense. In this way, businesses can increase the implementation and performance of innovation strategies. By sharing the increasing cost of innovation with stakeholders, the cost of the firm can be reduced, and profitability can be increased.

In this context, the research hypotheses discussed in the study are as follows.

H1: Increasing the intensity of competition increases technological collaboration.

H2: Increasing the intensity of competition increases the level of implementation of innovation strategies.

H3: Increasing technological collaboration increases the level of implementation of innovation strategies.

H4: In enterprises with high technological collaboration, the intensity of competition has a greater effect on the level of implementation of innovation strategies than those with low collaboration.

3. Research Method

The last half century has been a period in which businesses compete with each other through innovations and inventions. Companies that make more inventions and innovations can get ahead of their competitors, and those that can either fall behind in the competition or disappear. For this reason, understanding the success factors in implementing the innovation strategy is gaining more and more importance daily.

From this point of view, it is aimed to examine the effects of technological collaboration as a source of innovation in the implementation of innovation strategies of enterprises and the impact of increasing competition intensity in production firms. Considering the few studies on the subject in the literature, it makes a significant contribution to understanding the role of technological collaborations in terms of the success of implementing innovation strategies in competitive environments. The survey technique was used as the data collection method in the study.

3.1. Sample

In the study, Istanbul, Ankara, Bursa, and Kocaeli provinces were taken as the main mass. The most important reason for the determination of these provinces is that they are among the top ten provinces in Turkey's gross domestic product production and Turkey's industry and service production, and more than 50% of the production is carried out in these provinces (TOBB, 2018; TUIK, 2018).

In the study, which was carried out by convenience sampling within the determined universe, the data collected from 268 participants working as managers in production enterprises with the help of questionnaires were examined by least square structural equation analysis.

3.2. Measures

The scales in the literature and the validity of which was tested in different studies, were used to measure the variable. In the measurement of competitive intensity, Morgan et al., (2004) and the scale used by Baines and Langfield-Smith (2003). The scale was used by Ahmetoğulları and Yücel (2021) by adapting it to

Turkish. The scale consists of seven statements containing questions such as the number of leading competitors in the sector, the frequency of technological change, the frequency of introducing new products to the market, and the intensity of price competition. In the variable measured with the help of a five-point Likert scale, the participants were asked to evaluate the intensity of competition between "not at all" and "too much." High scores obtained as a result of the measurement indicate that the intensity of competition is high, and low scores indicate that it is less.

In the measurement of technological collaboration, Kao et al., (2008) used the scale. Ahmetoğulları and Yücel (2021) adapted the scale into Turkish and named the Technological Orientation Scale. However, when the scale expressions were examined, it was considered that it was a variable that measures the level of technological collaboration and openness since it was taken into account that it consisted of collaboration-oriented expressions. Therefore, the variable was used as Technological Collaboration in the study. In addition, in the study of Ahmetoğulları and Yücel (2021), it was observed that a question regarding the statements left out due to measurement problems was not valid for the study sample, and the validity and reliability of the statements and the scale were high. In the variable measured with the help of a five-point Likert scale, high-score answers given to seven items with values between 1 and 5 (1=Strongly Disagree … 5=Strongly agree) indicate high levels of collaboration and openness while low scores indicate low levels of openness.

In the study, a 6-items scale was included in the study of Zahra and Covin (1993), and including process and product innovation were used in the measurement of innovation strategy. The scale was used by Yücel and Ahmetoğulları (2016) by adapting it to Turkish. High-score answers to the questions indicate a high application level of the innovation strategy, and low-score answers indicate a low application level.

3.3. Research Model

The data obtained in the study were analyzed by partial least square structural equation analysis. The method was preferred because it provides higher reliability and validity in small sample sizes. The research model tested within the scope of the research is presented in Figure 1.

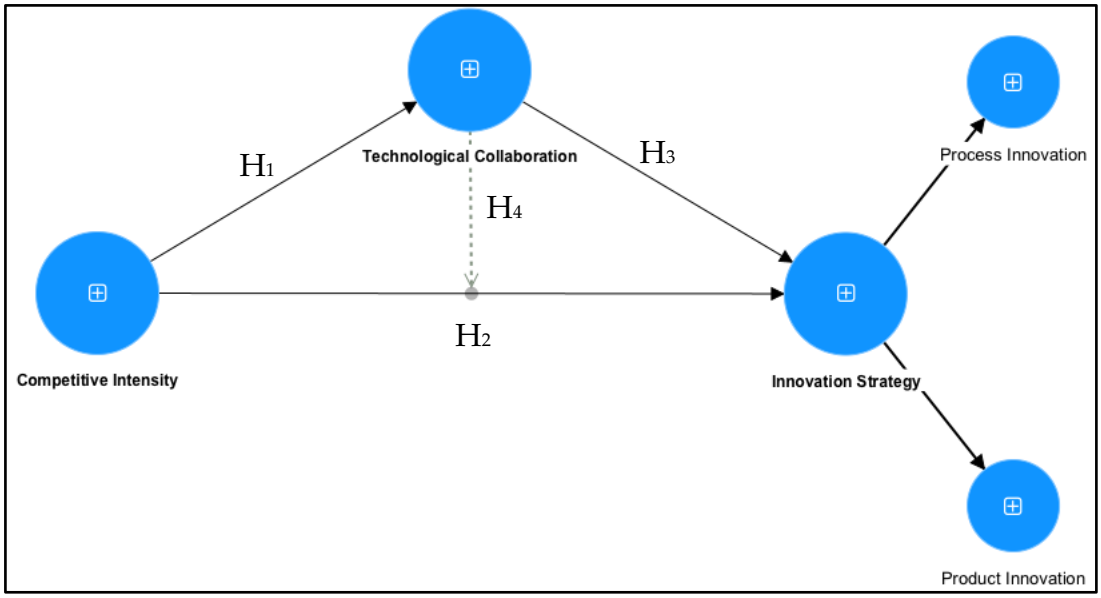


Figure 1. Research model and hypotheses

3.4. Findings

3.4.1. Respondents Profile

The descriptive demographic characteristics of the sample considered within the scope of the study are summarized in Table 1. 35.45% of the participants in the survey are female, and 64.55% are male. Regarding the age distribution of these participants, approximately 40% of the sample consists of participants aged 30 and under, 35% between the ages of 31-40, and 25% of participants aged 41 and over. When the distribution of the participants according to their educational status is examined, 34.47% have an associate degree or below, 51.14% have undergraduate, and 14.39% have graduate education.

Table 1. Descriptive statistics of demographic variables.

Gender	**N.O.**	**%**	**Age**	**N**	**%**
Female	95	35.45	**25 and below**	33	12,41
Male	173	64.55	**26-30**	73	27,44
Total	**268**	**100.00**	**31-35**	53	19,92
			36-40	40	15,04
Education	**N**	**%**	**41-45**	33	12,41
Associate degree or below	91	34,47	**46 and above**	34	12,78
Undergraduate	135	51,14	**Total**	**266**	100,00
Graduate	38	14,39			
Total	264	100,00			
Experience	**N**	**%**	**Position**	**N**	**%**
1-5 Year	78	30,35	**Owner Manager**	40	15,87
6-10 Year	62	24,12	**Senior Manager**	51	20,24
11-15 Year	41	15,95	**Mid-Level Manager**	116	46,03
16-20 Year	44	17,12	**Other Manager**	45	17,86
20 Year and above	32	12,45	**Total**	**252**	**100,00**
Total	**257**	100,00			

When the work experience of the participants in the sample is taken into account, 54.47% of the sample has ten years or less experience. In comparison, 46.53% consists of participants with 11 years or more experience. In addition, according to the working positions of the participants, 15,87% of them work as owner managers, or partner managers of the company. In comparison, 20,24% are in the top-level manager position in the general manager or assistant position. A significant portion of 46.03% consists of the participants in the role of department manager. 17.86% of the participants are unit managers/responsibles other than these.

The standardized basic statistics and correlation values of the variables are presented in Table 2.

Table 2. Basic statistics and correlation values of variables.

	N	**Mean**	**Median**	**Min**	**Max**	**Std. Dev.**	**CI**	**PCI**	**TC**	**IS**	**PI**
Competition Intensity (CI)	268	0.000	0.025	-2.994	1.763	1.000	1.000				
Process Innovation (PCI)	268	0.000	0.062	-3.384	1.210	1.000	0.392	1.000			
Technological Collaboration (TC)	268	0.000	0.000	-2.067	1.788	1.000	0.553	0.327	1.000		
Innovation Strategy (IS)	268	0.000	0.119	-3.521	1.336	1.000	0.423	0.921	0.356	1.000	
Product Innovation (PI)	268	-0.000	0.162	-3.088	1.246	1.000	0.386	0.690	0.327	0.917	1.000

3.4.2. Reliability and Validity of the Measures

The results of confirmatory factor analysis regarding the variables used in the research are presented in Table 3. Loading coefficients of 55% and below are not included in the table. When factor loadings are examined, it is observed that there is no expression loaded on more than one factor and factor loadings of 60% and above. Therefore, the variables are measured validly. In this context, it is seen that the findings obtained in the factor analysis are above the acceptable limits.

Tablo 3. Factor and reliability analysis results.

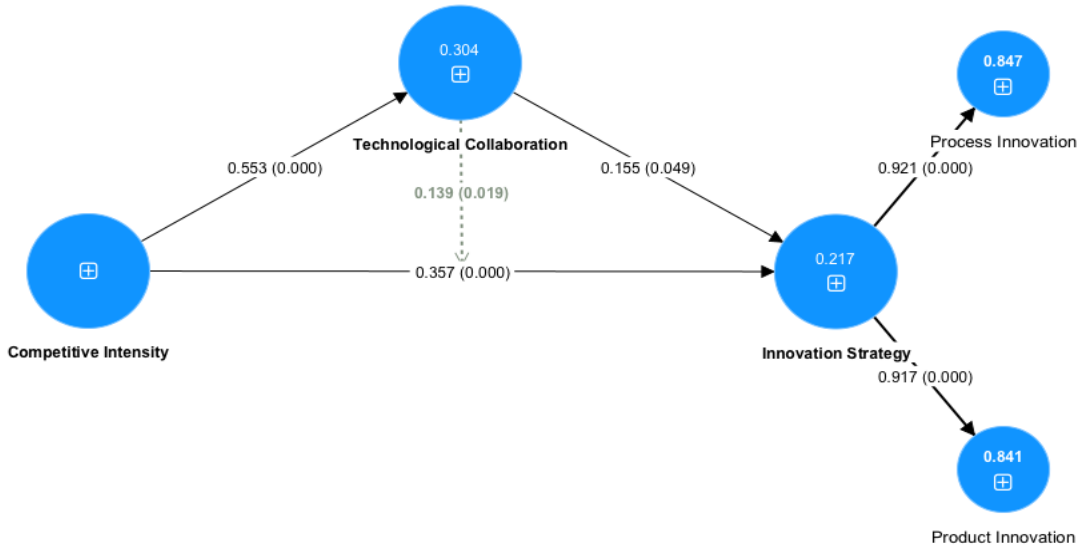
	Competition Intensity (CI)	Technological Collaboration (TC)	Innovation Strategy (IS)	Process Innovation (PCI)	Product Innovation (PI)	Cronbach's Alpha	rho_A	Composite Reliability	AVE
CI1	0.59					0.85	0.86	0.88	0.52
CI2	0.80								
CI3	0.73								
CI4	0.65								
CI5	0.73								
CI6	0.81								
CI7	0.72								
TC1		0.76				0.89	0.91	0.91	0.60
TC2		0.87							
TC3		0.88							
TC4		0.85							
TC5		0.62							
TC6		0.80							
TC7		0.62							
PCI			0,92			0.89	0.89	0.92	0.64
PI			0,92						
PCI1				0.80		0.85	0.85	0.91	0.77
PCI2				0.85					
PCI3				0.78					
PI1					0.82	0,84	0,84	0,90	0,76
PI2					0.78				
PI3					0.78				

As a result of the reliability analyses performed within the scope of the study, it is observed that the Cronbach Alpha values of the variables are 0.85 and above, and the Composite Reliability values are 88% and above. When factor loads, and reliability values of the variables in Table 3 are evaluated together, all Cronbach α values are well above the acceptable values revealed by Nunnally and Bernstein (1978). Similarly, as a result of confirmatory factor analysis, the composite reliability (CR) for all constructs exceeded 0.88, providing the acceptable reliability values of Fornell and Larcker (1981). The results show that the questionnaire and variables have high internal consistency, reliability, and structural validity. When the explained mean-

variance values of the variables for convergent and discriminant validity are examined, results above 50%, which is the expected value, are obtained, and the fact that each of the AVEs exceeds the square correlations between the constructs indicates that discriminant validity is provided. In this respect, it is observed that the Fornell and Larcker (1981) criteria are also met. In this framework, since the structural validity of the variables has been verified, evaluations regarding the model can be made.

3.4.3. Findings of the Hypothesis Testing

Structural path analysis was used to examine the relationships between the variables discussed in the study. The findings obtained as a result of the research are shown in Figure 2.



All coefficients in the model are standardized values and are statistically significant at at least the 5% level.

R^2 values of the variables are corrected R^2 values.

Model fit statistics: SRMR: 0.08, d_ULS: 0.98, d_G: 0.39, Chi-Square: 580.58, NFI: 0.81

Figure 2. Path Analysis Results of the Research Model

According to the results, it is observed that competitive intensity is a determinant that causes businesses to increase technological collaboration, as well as an increase in the level of implementation of the innovation strategy, in terms of the managers participating in the study in the businesses included in the sample. A one-

unit increase in competitive intensity increases the technological collaboration level of enterprises by 0.553, while it also increases innovation strategy implementation by 0.357 units. Competitive intensity explains a significant portion of 30.4% of the variation in technological collaboration. Similarly, a 1-unit increase in technological collaboration increases the level of innovation strategy implementation by 0.155. Competitive intensity and technological collaboration have a significant explained variance effect of 21.7% on the level of innovation strategy implementation. All effect coefficients and R2 values observed in the model are at least 5% statistically significant.

The results obtained from the model show that technological collaboration has both a direct and an indirect effect that conveys the impact of competitive intensity on the implementation of innovation strategies. The total effect results, including the direct and indirect effects of the variables, are shown in Table 4.

Table 4. Total effects between variables.

	Total effects
Competitive Intensity -> Technological Collaboration	0.553
Competitive Intensity -> Innovation Strategy	0.443
Competitive Intensity -> Process Innovation	0.408
Competitive Intensity -> Product Innovation	0.406
Technological Collaboration -> Innovation Strategy	0.155
Technological Collaboration -> Process Innovation	0.143
Technological Collaboration -> Product Innovation	0.142
Innovation Strategy -> Process Innovation	0.921
Innovation Strategy -> Product Innovation	0.917
Technological Collaboration x Competitive Intensity -> Innovation Strategy	0.139
Technological Collaboration x Competitive Intensity -> Process Innovation	0.128
Technological Collaboration x Competitive Intensity -> Product Innovation	0.127

Considering the results, it is seen that the intensity of competition significantly affects the implementation of the innovation strategy. Competition intensity directly and indirectly affects the innovation strategy at the level of 0.443 positively and significantly (0.01). It is observed that technological collaboration has a significant and positive effect of 0.155 on the innovation strategy.

The findings also show that technological collaboration moderates the intensity of competition and the level of innovation strategy implementation (Figure 3). The level of implementation of innovation strategy against the intensity of competition increases by 13.9% in companies with one standard deviation higher level of technological collaboration compared to their competitors. Similarly, the level of implementation of innovation strategy against the intensity of competition decreases by 13.9% in companies with one standard deviation low level of technological collaboration compared to their competitors.

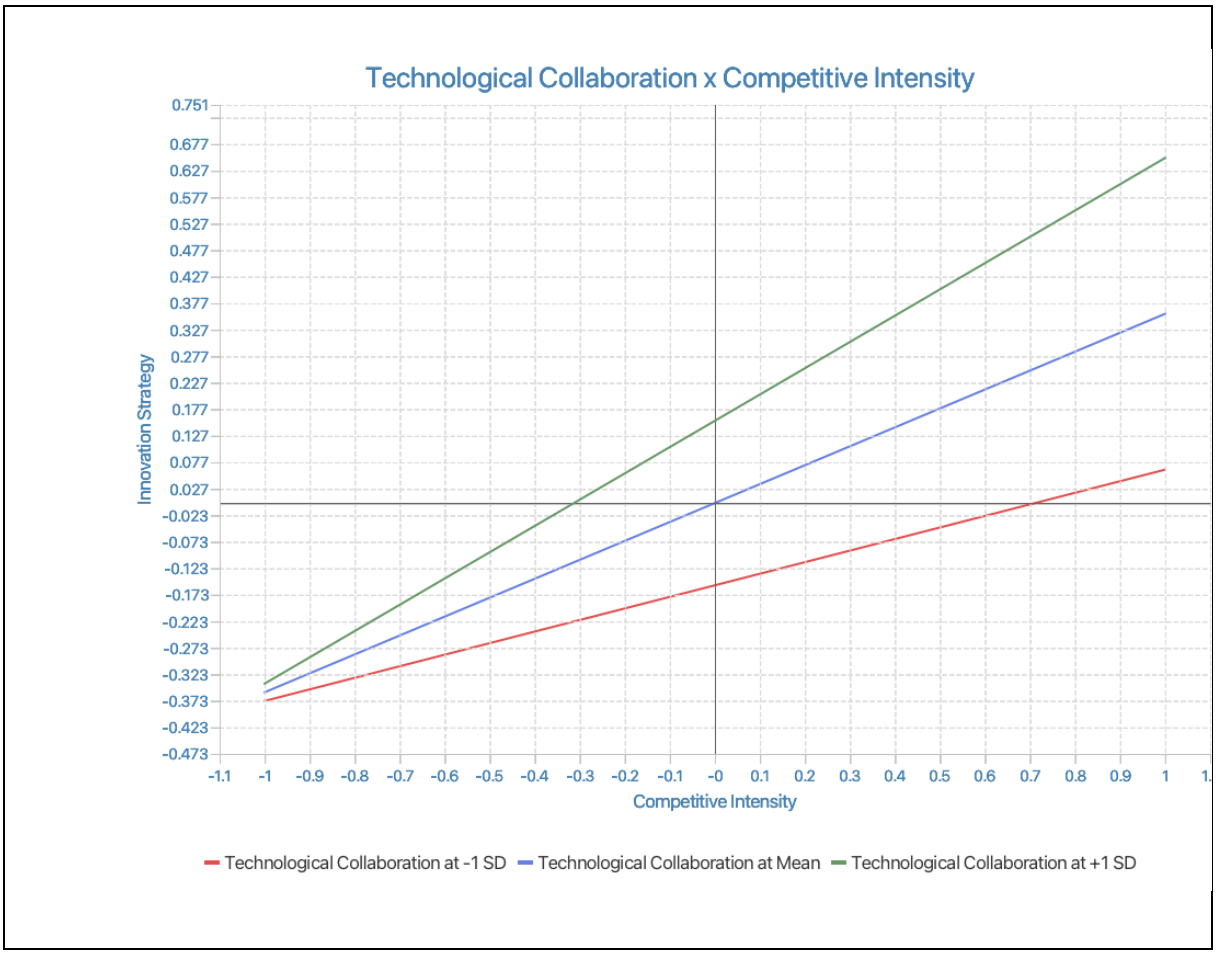


Figure 3. Analysis results on the regulatory impact of technological collaboration

The results of the analysis show that technological collaboration has a significant positive regulatory effect at the level of 0.01 in the relationship between the intensity of competition and innovation strategy. Accordingly, the positive effect of

competition intensity on innovation strategy increases as the level of technological collaboration increases.

Table 5. Path coefficients and significance levels

	Hypothesis	Mean	Std. Deviation	T	P
Competitive Intensity -> Technological Collaboration	H_1	**0.553**	**0.048**	**11.460**	**0.000**
Competitive Intensity -> Innovation Strategy	H_2	**0.357**	**0.082**	**4.374**	**0.000**
Technological Collaboration -> Innovation Strategy	H_3	**0.155**	**0.078**	**1.977**	**0.049**
Technological Collaboration x Competitive Intensity -> Innovation Strategy	H_4	**0.139**	**0.059**	**2.357**	**0.019**

In the light of the results obtained in Table 5, according to the sample results, all hypotheses were significant at the 5% level and were accepted.

4. Discussion and Conclusion

The developments in the last half-century have caused innovation to be an essential competitive tool for businesses to compete with each other. It is observed that innovation has become an essential tool in obtaining competitive power due to the performance improvements it provides in the product, process, and managerial organization of the organization. For this purpose, within the scope of the study, the effects of competition intensity and technological collaboration in the implementation of innovation strategies in terms of the Turkish sample are discussed.

The findings show that the level of use of innovation strategies, which are among the priority strategic preferences of enterprises, has increased in sectors or market segments where the intensity of competition is high. In addition to this effect, the increase in the intensity of competition allows businesses to find universities, research centers, suppliers, etc., which can be expressed as external sources of innovation for innovation. It also increases technological collaboration with stakeholders and opens up to the outside. This finding shows that businesses see innovation as an essential strategic choice in environments where the intensity of competition increases, and they turn to external resources to implement such a preference.

Findings are like Aliasghar et al., (2022) findings on the positive effect of competition intensity and use of external knowledge on process innovation in the automotive industry and the results of Nieto and Santamaria (2006) on the positive effect of collaboration on process and product innovation in Spain. The findings also support the conclusions of Ang (2008) that the intensity of competition increases collaboration and positively affects firm growth.

In this interaction, besides its role that directly supports the implementation of technological collaboration innovation strategies, it also has an essential regulatory effect that differentiates the level of implementation of innovation strategies against the increase in competition intensity. While the implementation of innovation strategies increases by 13.9% against the rise in the intensity of competition at low technological collaboration levels, this increase is higher at the same rate at high technological collaboration levels. In this respect, it can be said that establishing technological collaborations with their stakeholders facilitates and increases the implementation of innovation strategies.

Hindi and Frenkel (2022), in their study conducted in the Israeli sample, report that firms that cooperate achieve significantly higher innovation output and firm revenue than those that do not. These findings, similar to the study results, reveal the importance of collaboration in terms of the sustainability of innovation strategies.

When the results obtained in the study are considered in general, it can be said that the increase in the intensity of competition directs the enterprises to implement innovation strategies and technological collaborations within this. The increase in collaboration with stakeholders such as universities, research centers, suppliers, customers, and competitors facilitates and increases companies' level of implementation of innovation strategies and thus, their innovation performance.

The fact that the study was conducted in production enterprises and in a limited region limits the results obtained. Conducting similar studies in different sectors and

samples will make it possible to obtain more comprehensive results and to test the findings comparatively.

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