

THE PERFORMANCE OF SME INNOVATION DETERMINED BY THE TECHNOLOGICAL CAPABILITY AND COLLABORATION

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Abstract

So far, the present literature has not been able to fully explain the factors responsible for influencing the growth and development of the performance of new products as well as of the technological capacities within the Romanian SMEs.

For this reason, following the evaluation of the existing literature, it was found that the poor performance of Romanian producing SMEs is attributed to their inability and inability to innovate.

From this perspective, innovation is the specific function of the company's resources, along with technological capabilities. In conclusion, this study highlights and recommends in the abstract that product innovation performance and technological capabilities are significantly improved by involving other partners, most often gained through effective technological collaboration.

Consequently, obtaining empirical validation of the model provides significant implications for all industry factors, policy makers, managers, owners and other stakeholders.

Keywords: strategy, technological collaboration, SMEs, technological capacity, product innovation.

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1. Introduction

A significant contribution is made by small and medium-sized enterprises in terms of employment, innovation, research and competitiveness. From this point of view, the development of a competitive and dynamic SME sector becomes a priority, which can contribute to poverty reduction, employment and implicitly to economic growth (Georgiana, 2020). In the opinion of Fadol and Sandhu, (2013), the ambition of survival and growth of the competitive position in an environment characterized by dynamics turns collaboration into a frequent obvious phenomenon mainly in today's companies. For this reason, enterprises in an environment defined by a permanent change no longer have the capacity to manage, develop or feed in an independent and especially efficient way the knowledge bases held (Pett & Dibrell, 2001, Pateli, 2009). Knowledge and learning are crucial success factors for more and more companies (Ceptureanu, 2015). Therefore, according to Perez, Whitelock and Florin, (2013), for a company, the increasing complexity of all knowledge supported by an operational business environment and rapid development has made it relatively difficult to capitalize on all relevant information and knowledge and personal development. Innovation, research, knowledge transfer and technological information are successful factors in the contemporary economy (Stanciu, 2018). Innovation is recognized as an important contributor to organizational success and performance (Nicolescu & Nicolescu, 2012). A radical change in the models of corporate and economic governance, previously based on capital and labor in the knowledge-based economy, is caused precisely by the transformations that have taken place in the socio-economic environment. Innovation today is a real tool for improving living standards and also a real answer for growth and survival. (Panduru, Neamtu & Neamtu, 2020).

Research and development processes increase productivity, which means that companies determined and involved to develop their performance and production level will report innovative services or products, high efficiency in terms of quality and quantity, more competitive incentives and compensation programs for the workforce. (Burcă-Voicu & Maniu, 2014). Due to the global

competition, the increased pressures of the markets in a permanent exchange as well as the more and more dynamic technologies, most companies face the urgent need for transformation at strategic level (Ceptureanu, Ceptureanu, Popescu & Vlad, 2017). Today, companies are frequently engaged in many networks and collaborations, so that they use from partners the skills, knowledge but also resources to improve the competitiveness of the market position (Todeva & Knoke, 2005, Salisu & Abu Bakar, 2018). Strategic creativity, responsible for increasing the capacity to maintain, improve and attract knowledge has become essential to any technology-oriented organization to meet and survive competition in the 21st century (Madu, 2016). The innovation-oriented structure refers to various specific mechanisms for capitalizing external and internal knowledge in systems, methods, projects and ideas that favor the external and internal flows characteristic of an innovative process. It is necessary for business models to be flexible and relatively easy to adapt to different opportunities that may arise, in order to benefit from them and thus generate added value for the company (Olaru, Dinu, Keppler, Mocan & Mateiu, 2015). The innovation process works in multiple directions representing the development factor and the creative force that requires the radical exploration of all possibilities (Epuran, 2015). Sustainable development is all the methods and forms of socio-economic development, the foundation of which is primarily to maintain a balance between the elements of natural capital and socio-economic systems (Vasilescu, 2020).

However, even if companies have the qualified and specialized human resources necessary to improve the internal learning capacity absolutely indispensable for the absorption and adaptation of external technology useful to match the constraints dictated by their production, the presence of an effective relationship between knowledge institutions and companies has not been noticed. which visibly influences the growth and development of companies' technological capabilities (Adelowo, Ilori, Siyanbola & Oluwale, 2015). Furthermore, even in these conditions, production companies have production processes based on traditional criteria rather than based on the exploration and exploitation of modern technologies from both outside and inside the business (Adegbite, 2012, Apulu, 2012). In this way, in the opinion of Aworawo, (2011), the active implementation but also the strategic planning specific to a certain determined collaboration strategy forms the necessary basis for the development and efficient support of the technological capacities for innovation. Today, competitive economies are a model of regional networks and clusters, where innovation is stimulated by an intensive interaction between industries and in which intensive knowledge services play an important role in the development and distribution of news (Iosif & Tăchiciu, 2016). Regardless of the reference system - local, regional, national, etc. - the growth and development of communities is directly dependent on the dynamics generated by sustainability, intensity and quality of activities supported and initiated by entrepreneurs (Calin, 2020).

It has long been established that the ability of a company to collaborate directly influences the aggression manifested by its technological capacity (Manzini, Lazzarotti, Pellegrini & Aloini, 2015). According to Ryzhkova, (2015), the performance of firms in terms of innovation is significantly increased by their collaboration with customers, but further research is needed on the various measures needed to achieve innovative performance, to refine the conclusions of his study. Even if, in order to optimize the access to knowledge and essential resources necessary for the development of technological capabilities by the company, strategic collaboration becomes particularly important, there are many studies on the links between successful product innovation, technological capacity and technological collaboration. In conclusion, this study assumes that the technological collaboration present between the value chain specific to production industries can optimize the standard of innovative performance and technological capabilities.

2. Research of the specialized literature

This section of the study will examine and critically estimate the conceptual relationship between the success of product innovation, technological capacity and technological collaboration.

2.1 Technological collaboration

In general, cooperation is considered to be common between companies, although it can exist at multiple levels, from individuals to networks and organizations. Regarding the inter-organizational cooperation present in the networks, the common approach is represented by the relational approach, focusing primarily on the existing relationships between various actors that create common value for them and for the other members of the network (Ceptureanu, Ceptureanu, Radulescu & Ionescu, 2018). According to Tsasis, (2009), technological collaboration is presented as an effort made between companies in order to gain mutual benefits through the process of exchanging resources and information. In the opinion of Snavely and Tracy, (2002), a certain territory of technological collaboration is maintained, thus accepting the fact that fulfilling the objective set by the company or solving the technological problem is particularly complicated, maybe even unfeasible. In conclusion, according to Guo and Acar, (2005), in the collaboration process are involved exactly those companies that act together with various partners in order to achieve the common goal with the help of resources and united efforts. According to Burgess, Gules and Tekin, (1997), those companies engaged in a collaboration mechanism established with companies and suppliers achieve real success following the process of implementing automated technologies for manufacturing.

Together with the improvement of knowledge and industrial development, the use of knowledge re-presents an important new economic resource, able to completely change the approach related to competitiveness and performance (Gherghina, Botezatu, Hosszu & Simionescu, 2020). Absolutely, the company's competitive position and performance do not depend on the resources held but rather on the value of the business, the ability to share and acquire resources, knowledge and information necessary to complement each other in the process of sharing benefits and risks. and in the extent and depth of collaboration with various other partners (Chesbrough, 2003, Sambasivan & Yen, 2010, Qing, Weijing & Wenhui, 2012). In this way, according to Ju, Chen, Li and Lee, (2005), in technology-oriented industries, where rapid changes in technology are present, higher costs allocated to product development as well as a certain complexity of it becomes extremely collaboration is needed. The companies were asked by Sompong, Igel and Smith, (2014) to be engaged in a technological collaboration with direct benefits in order to establish a bilateral projection from technology, to capitalize on the management style as well as the opportunities that arise it seems to have a positive impact in terms of commercial performance but also in terms of partnership. A natural commitment is manifested in the direction of manufacturing alliances, licensing agreements, technology transfers, research and development. According to Das, Sen and Sengupta, (2003), mainly the technological network is made within the enterprises present in the component of the higher value chain and usually involves exchanges of knowledge, experience, skills and information.

With priority in the high-tech industry, business organizations have mobilized all the technological capacity resources that are available to improve the life cycle necessary for growth and development, thus optimizing key competencies (Qing, Weijing & Wenhui, 2012), forming a network wide range of services but also ensuring penetration and access to a new market (Fouts & Rajasekar, 2009), and similarly branding, detailed sales as well as marketing skills are also important reasons for partnership collaboration (Aikaterini Konstantina & Wigley, 2011). Under these conditions, Wang et al., (2011) requested that company managers, before engaging with other

partners in the alliance, investigate but also reconsider their internal capabilities, as acquiring and accessing capabilities from external partners in a large measure depends on the structure and composition of the internal capacities of the respective companies. In order to efficiently develop a portfolio necessary for technological collaboration, it is particularly important for companies to strengthen the balance between industrial collaboration and research institution, with priority in harmonic and reciprocal ambidexterity (Yang Liu, Ying & Fagerlin, 2015). Harmonic ambidexterity is focused, within a certain department, on the simultaneous search and identification of exploitation and exploration, while reciprocity focuses mainly on the successive search of the exploration and exploitation company between divisions (Souder, Veiga, Heavey & Simsek, 2009).

2.2 Technological capacity

Technological capacity (TC) is characterized as the sum of all the skills of the organization that are directed towards obtaining the expected and necessary technical knowledge to improve business performance (Altalib & Sardoh, Yahya Al-Ansari, 2013). Thus, according to Zahra, (1996), the importance of technological capabilities in the effort to significantly change the success of the company in a dynamic and rapidly changing business environment has been practically widely recognized in the academic literature. In conclusion, according to Utterback, (1994), technologies are used by business firms to continuously improve a competitive position, by exploiting new processes or by including new products. Therefore, according to Zahra, (1996), the intense effects of technology on the activities of enterprises have universal manifestations in the activity of all economic fields. In this way, according to Zhou, Yim and Tse, (2005), technological capacity is defined as a critical element responsible for improving the company's performance and consequently, to perform efficiently and efficiently its daily activities and processes, companies are dependent on the technological capacity they have (Ajonbadi, nd).

According to Oluwale, Siyanbola, Ilori and Adelowo, (2015), in general, companies are committed to developing and increasing technological capabilities in order to improve international competitiveness, optimize profits and turnover, reduce production costs and increase production. According to Hitt and Hoskisson, (1990), the audacity shown in relation to technological activities directly influences the repositioning of the competitive advantage of that company. In conclusion, most of the innovative companies remain steady with investments made with priority in development and research and also show proactive aggression in order to discover new technologies and obtain new ones during the development of new products that can satisfy better than competitors in market customer expectations (Hitt & Hoskisson, 1990, Zhou et al., 2005). In the opinion of Lestari, Thoyib, Zain and Santoso, (2013), the company's efficiency in modeling innovation is enhanced by its capacity for technological innovation, which admits and facilitates obtaining better and differentiated performance in a specific interaction with environmental challenges but also with market demand. According to Mad Lazim, Othman and Ahmad, (2014), technological capacity is that vital component specific to the capabilities of companies largely responsible for contributing to better performance, and for this reason it is absolutely necessary to be reconsidered by to manufacturing companies. Therefore, according to Chantanaphant, Nabi and Dornberger, (2012), this makes it easier for companies to improve efficiency, reduce costs, encourage inter-organizational collaboration, develop new knowledge and update processes and products.

Moreover, due to the processes of cumulative knowledge, the multidimensional nature of technologies and the consequences of the short life of the product, it is a priority for the organization to be progressively engaged in the process of obtaining knowledge from external

partners to complete internal development activities and research (Brunswick & Vanhaverbeke, 2014, Chesbrough & Crowther, 2006). In this way, according to Chesbrough, (2003), in the theory of open innovation, appropriately, the role played by the external source for knowledge in the process of modifying technological innovation was highlighted. Consequently, according to Alvarez and Iske, (2015), the opinion that guides the theory of open innovation enshrines the fact that organizations are able to obtain priority skills and knowledge in order to innovate mainly from different external sources. According to Chesbrough and Crowther, (2006), organizations can only be involved in open innovation in two ways: (1) Open input innovation and (2) Open output innovation. According to Alvarez and Iske, (2015), open input innovation represents the internal transfer of technology, where companies evaluate and scan their operating environment with their own conception necessary to identify technological knowledge for supply and combine them within own knowledge bases. Open-ended innovation, on the other hand, in agreement with Lichtenthaler and Lichtenthaler, (2009), refers directly to the external transfer of technology, a transfer by which firms are interested in higher external bodies to market technology in an appropriate manner.

According to Huang, (2014), the capacity of the organization necessary for the continuous replacement of competitors is directly dependent on openness to information uniquely held by other market participants as well as openness to relevant external technologies. Moreover, rapidly changing technology as well as the growing pressure of rivals in the current business environment (Davis, 2007) have made the process of collaborating with other market participants a crucial condition for increasing the success of that market (Davis, Bell, Payne & Kreiser, 2010) Thus, according to Gathungu, Aiko and Machuki (2014), for the organization involved in collective activities but also in interorganizational relationships structured in strategic networks, the main This is currently the reason for the attempt to overtake competitors. Therefore, in agreement with Qing, Weijing and Wenhui, (2012), to increase core competencies in many of the organizations the strategic cooperation relationship has taken the place of the competitive rejection relationship.

2.3 Technological capacity and technological collaboration of the company

According to Ju, Chen, Li, and Lee, (2005), in order for organizations to survive, the acquisition of external technologies through present relationships between organizations has become a critical and tactical issue. According to Khamseh and Jolly, (2008), the present collaboration between organizations generates with priority learning, knowledge transfer as well as multiple opportunities for access to knowledge. Consequently, in a certain industry where companies vary in terms of cost structure, the differentiation of those costs is minimized by alliance learning (Das, Sen & Sengupta, 2003), and thus the solution to increase customer satisfaction and gain the advantage competitive is dependent on the skills and strength of organizations absolutely necessary to develop the capacity of the learning alliance (Love & Gunasekaran, 1999, Taylor, 2005). According to Dealtry, (2008), Glenn Richey and Autry, (2009), the learning process in the current business environment is an interdependent activity through which the customer and the supplier, employees and employers interact in order to obtain excellent skills essential for exploitation and identification. absolutely necessary opportunities for performance optimization.

According to Bierly, Damanpour and Santoro, (2009), the exploration as well as the acquisition of external knowledge is a crucial element necessary in order to obtain a sustainable competitive advantage for the company. Under these conditions, according to Taylor, (2005) the success of the collaborative alliance is largely dependent on the openness and availability of partners present in the alliance in order to transmit knowledge and skills as well as the absorption of better and newer knowledge from to partners. Therefore, it represents, within the alliance, the

function of formalizing commitment and trust (Taylor, 2005, Todeva & Knoke, 2005, Wahyudi, 2015). Moreover, commitment and trust are the main factors that can influence the success of the strategic alliance and which, in turn, facilitates effective learning through problem solving (Mellat - Parast and Digman, 2007, Davis & Love, 2011, Valdés-Llaneza & García -Channel, 2015). Under these conditions, according to Wahyudi, (2015), social capital, interdependence agreement but also coordination build the transfer of knowledge and trust between partners.

According to Thorne and Wright, (2005), the collective and individual goal can be achieved only through effective management for inter-organizational learning. Ford et al., (2003) established that the business alliance facilitates openness to important market information and the collective resources of the partners could be adequate levers to achieve better flexibility, higher quality of products as well as greater customer satisfaction. According to Ricciardi, (2014), for efficient marketing and successful investments the available resources are provided by alliances. According to Trifilova, Bartlett and Altman, (2013), Russian companies are involved in short-term collaborations with suppliers and customers in order to liberate the industry and therefore the country's institutions responsible for development and research have made huge progress during the exit process. command in terms of adapting to environmental changes as well as boosting the market economy.

Therefore, firms apply inter-organizational relationships and specialize in complementing knowledge (Davis & Love, 2011, Yang Liu, Ying, & Fagerlin, 2015). According to Thorne and Wright (2005), this has developed a more interdependent environment, where efficient interaction management is the necessary foundation for gaining a competitive advantage. From this point of view, according to Dealtry (2008), companies that consider the development and improvement of superior products are required to learn separately from suppliers, customers, channel members and various other organizations and to collaborate. According to Taylor, (2005), long-term, prospective learning from successive interactions between organizations, creates various opportunities to develop the collective conception of innovation and value. In conclusion, according to Qing, Weijing and Wenhui, (2012) the alliance with a suitable partner significantly optimizes the autonomous capacity for innovation, while the standardization capacity, reputation and compatibility of alliance partners influence the performance due to innovation.

According to Todeva and Knoke, (2005), companies, with the help of strategic technological collaborations, efficiently transfer employees' skills in the collaborative development and research project, unique reserves of unique resources as well as patented knowledge, obtaining the most or technological innovation, which presents extensive applications for products and which bring rewards to all partners. Consequently, according to Belderbos, Cassiman, Faems, Leten and Van Looy, (2013), companies, in order to sustain a higher competitive advantage as well as innovation in today's environment characterized by rapid change, are forced to amplify collaboration for development and research with public institutions involved in research, necessary to benefit from the benefits of combining the knowledge and skills of partners in order to develop new technological solutions for the association. Therefore, according to Briggs, (2015), enhancing the partnership for development and research with various other institutions involved in research allows companies to minimize the weight of development and research costs and at the same time to share partners the specific risk of failure, thus achieving efficiency improvements for the innovation process of the participants. In conclusion, according to Natalicchio, Petruzzelli and Garavelli, (2017), the collaboration achieved in the development and research leads to the development of innovative united solutions.

In this way, according to Zhang, Duysters and Filippov, (2012), the move towards strategic collaboration significantly increases, with priority given to Chinese companies that tend to improve

and technically recover their attributions in terms of internationalization and thus be able to enable companies to learn technological capabilities from market leaders. Under these conditions, previously, Zineldin and Dodourova, (2005) argued that for companies present in the car market and making alliances with partners, managerial and strategic reasons are much more important than financial and technological reasons. Also, Natalicchio, Petruzzelli and Garavelli, (2017) certified that technological collaboration supports technologically diversified enterprises in the innovation of technological patents that have a very high impact. Naturally, in order to successfully meet customer requirements but also to keep pace with competitors in the industry, SMEs are engaged in collaboration or open innovation (van de Vrande, de Jong, Vanhaverbeke & de Rochemont, 2009). In conclusion, according to Chesbrough (2003), the identification and certification of a certain technological collaboration established with the research institution, competitors and customers could be considered an effective strategy adopted to access external knowledge and capabilities for joint or individual development of innovative capabilities based on the open innovation model.

2.4 Product innovation performance and technological collaboration

According to the existing literature, the innovation of those successful products involves technical efforts as well as a commitment of resources (Abu Bakar and Ahmad, 2010), aspects that may not be readily available in SMEs (Ukko, Pekkola & Saunila, 2014) but also in companies in developing countries (Olughor, 2015, Afolobi, Omohimoria, Daniyan & Adeodun, 2015). Given that companies do not have the opportunity to provide all the necessary capabilities and resources for the continuous development of new products, those companies that show an orientation towards innovation and technology amplify the collaboration with the most important bodies outside or within the supply chain of (Hassan, Brah, Kannan & Shakeel, 2017). According to Todeva and Knoke, (2005), through strategic technological collaboration, companies are encouraged to transfer skills, distinct resources and patented information but also to purchase, in order to achieve successful product innovation. Within the innovation process, the major, determining and indisputable factor is represented by knowledge. Consequently, according to Huizingh, (2011), external players such as research institutions, competitors, suppliers and customers provide technological solutions capable of enhancing the company's innovation, while exploiting the solutions advanced by the company.

According to Ryzhkova, (2015), companies present in even different industries, due to the intense and wide dissemination of knowledge in the business environment in which they operate, access all the sources of valuable knowledge beyond their borders. According to Chesbrough, (2003), this development is dependent on the concept of open innovation. This concept involves various practices capable of accessing and consuming both external and internal knowledge flows. Moreover, in the name of the alliance, technological collaboration is not enough; if companies aspire to support, promote performance and focus on competitiveness, collaboration is bound to facilitate the development and growth of new and distinct values for stakeholders and companies (Parung, Albores, Martinez & Bititci, 2004). Participants in this collaboration normally provide various resources and skills that succeed in increasing the performance of innovation and at the same time complement and improve the company's capacity for innovation (Becker & Dietz, 2004, Salisu & Abu Bakar, 2018).

According to Gassmann, (2006), one of the most effective and widely valued strategies in the theory of open innovation is represented by customer participation. In conclusion, according to Briggs, (2015), obtaining a certain collaboration with other research institutions in the field of development and research facilitates companies to share risk in case of failure and reduce to a

minimum the pressure of costs necessary for development and research, thus intensifying the expected efficiency for the product innovation process. The influence exerted by the alliance of suppliers on the performance of new products is enhanced precisely by the technological capacity of the company, according to Tsai, Tsai and Wang, (2012). In a research conducted on companies operating in the US manufacturing industry, Caner and Tyler (2013) reported that working with other participants in the development and research process positively influences the product innovation process, and Aloini, Pellegrini, Lazzarotti and Manzini, (2015) report that the process of strategic collaboration increases the performance of the company's innovation as well as the technology of the effect. In conclusion, numerous studies have highlighted the fact that collaboration with partners significantly influences the company's product innovation (Nieto & Santamaría, 2007, Qing et al., 2012, Mitrega, Forkmann, Zaefarian & Stephan, 2017).

2.5 Product innovation performance and technological capacity of the company

According to Löfsten, (2014), today, more than ever, the mission of technological capabilities in producing a perpetual flow of product innovation becomes particularly important in terms of improving the company's performance in shorter product life cycles, especially competition. strong global technology and rapidly changing technology. In conclusion, the main concern of managers within the company is represented by diversity management in terms of product innovation. Therefore, in order to identify the solutions needed to solve the problems related to the management of the innovation process, the technological capacity could be fundamental. In the opinion of Lestari, Thoyib, Zain and Santoso, (2013), technological capacity, with the help of an efficient innovation process, authorizes companies to create differentiations in the reaction to the marketing of a constantly changing environment. Thus, according to Nerkar and Roberts, (2004), technological capacity is the strategic resource involved in simplifying the specific process of combining and acquiring emerging knowledge in new more valuable products as well as in optimizing complementary habits particularly necessary to facilitate distribution and the production of those products. Also, in the opinion of Chantanaphant, Nabi and Dornberger, (2013), technological capacity symbolizes an important strategic resource especially necessary for companies in order to obtain competitive advantage. Thus, according to Tsai, (2004), companies with a superior technological capacity gain superior differentiation through product innovation as well as greater efficiency in the pioneering process in terms of innovations that adequately meet the demands the rapidly changing market. Figure 2.1 represents the proposed general framework:

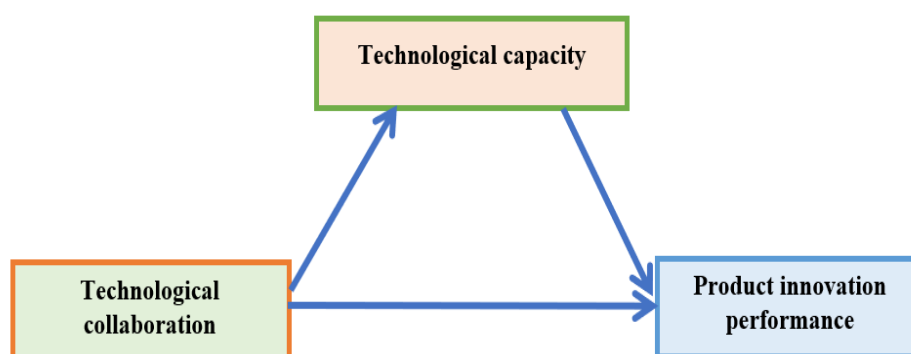


FIG. 2.1: Proposal of the research framework

2.6 Conclusions

Identifying the desire to efficiently meet customer requirements as well as maintaining the pace of competition are the main reasons that drive SMEs to be permanently engaged in collaboration or open innovation (van de Vrande et al., 2009), in order to improve the innovation process (Salisu and Abu Bakar, 2018). Moreover, according to Chesbrough (2003), extending technological collaboration to various other partners is an effective strategy through which companies can quickly access external knowledge and capabilities to jointly develop innovative technological capabilities in perfect contingency with the open innovation model.

This study aims to validate from a theoretical point of view the theoretical importance of technological collaboration in terms of improving the performance generated by product innovation and optimizing the technological capacity held by SMEs. Extremely criticized studies confirm the potential significant relationship between the performance of product innovation, the technological capacity of the company and technological collaboration. In conclusion, according to the figure above, the relationship between these variables provides a clearer understanding of the situation, while presenting to the manager / owner the significance of technological capabilities, technological collaborations to improve performance through product innovation and competitive advantage in if it is empirically validated.

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