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The influence of competence in information technologies on the innovation capacity in mozambican organizations

A influência da competência em tecnologias da informação na capacidade de inovação em organizações moçambicanas

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HIGHLIGHTS

- IT competence strongly influences innovation capacity in Mozambican organizations, enabling strategic responses in products, services, processes, markets, and organizational behavior.
- The study confirms five key IT competence dimensions—Infrastructure, Business Reach, Proactive Posture, Integration, and Flexibility—as essential drivers of innovation.
- Using PLS-SEM, the model explains 78.7% of innovation capacity variance, confirming a robust predictive relationship with IT competence.
- Organizations with skilled IT teams and integrated technologies are more agile and responsive to innovation demands and market dynamics.
- Findings support IT investments as strategic enablers for innovation, competitiveness, and sustainable development in Mozambican organizations.

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KEYORDS

IT Competence

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ABSTRACT

Objective: this study analyzes the relationship between Information Technology (IT) competence and the innovation capacity of Mozambican organizations across various sectors and sizes.

Design/Method/Approach: data were collected via an electronic questionnaire focused on IT competence and innovation capacity. A total of 136 valid responses were analyzed using partial least squares structural equation modeling (PLS-SEM) with SmartPLS 3.3.2®.

Originality/Relevance: the study contributes to understanding how IT competence impacts organizational innovation in a developing country, highlighting the need for effective use—not just possession—of IT resources.

Main Results/Findings: results show that IT competence significantly influences innovation capacity in Mozambican organizations, enabling them to respond to market signals with innovations in services, products, processes, strategies, behavior, and markets.

Theoretical/Methodological Contributions/Implications: empirical evidence confirms five theoretical dimensions of IT competence: infrastructure capacity, business spanning capability, proactive posture, flexibility, and integration, reinforcing their role in enabling innovation.

Social/Managerial Contributions: for Mozambican organizations to remain competitive, substantial investment in all IT competence dimensions is required to ensure agility and innovation at all organizational levels.

PALAVRAS-CHAVE

Competência em TI

Capacidade de Inovação

Tecnologia da Informação

RESUMO

Objetivo: Este estudo analisa a relação entre a competência em Tecnologias da Informação (TI) e a capacidade de inovação de organizações moçambicanas de diferentes setores e portes.

Design/Método/Abordagem: os dados foram coletados por meio de um questionário eletrônico com foco na competência em TI e na capacidade de inovação. Foram obtidas 136 respostas válidas, analisadas por modelagem de equações estruturais com mínimos quadrados parciais (PLS-SEM) utilizando o software SmartPLS 3.3.2®.

Originalidade/Relevância: o estudo contribui para a compreensão de como a competência em TI impacta a inovação organizacional em um país em desenvolvimento, destacando que não basta possuir recursos de TI — é necessário utilizá-los efetivamente.

Principais Resultados/Descobertas: os resultados indicam que a competência em TI influencia significativamente a capacidade de inovação das organizações moçambicanas, permitindo-lhes responder aos sinais do mercado com inovações em serviços, produtos, processos, estratégias, comportamento e no próprio mercado.

Contribuições/Implicações Teóricas/Metodológicas: evidências empíricas confirmam cinco dimensões teóricas da competência em TI: capacidade de infraestrutura, abrangência dos negócios, postura proativa, flexibilidade e integração, reforçando seu papel na promoção da inovação.

Contribuições Sociais/Gerenciais: para se manterem competitivas, as organizações moçambicanas precisam investir fortemente nas diversas dimensões da competência em TI, garantindo agilidade e inovação em todos os níveis organizacionais.

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1. Introduction

To meet market challenges, organizations must monitor development and key trends to satisfy customers, producers, suppliers, partners, and other market players. The market is unpredictable, considering the competition to which organizations are subject, market changes, and technological advances in other respects (Drucker, 1985; Schumpeter, 1997).

One of the appropriate ways to monitor organizational development is to improve your information acquisition strategies, both inside and outside the organization. Many researchers see information technologies (IT) as driving innovation within the organization (Panda & Rath, 2017, 2018; Queiroz et al., 2018; Tallon et al., 2019; Zain et al., 2005).

Nowadays, organizations experience intense competitiveness generated by technological progress, consumer changes, demands, economic cycles, globalization, competition, etc. With these challenges, organizations seek to be increasingly effective and agile as a strategy of organizational competence to detect and measure market opportunities. In this sense, organizations seek to adjust their resources, strategies, and infrastructure to adapt to the new reality they face (Panda & Rath, 2017).

The technological context includes all the techniques available in the market that the organization owns and uses to provide different changes that the market may require. It can be an incremental, synthetic, or discontinuous process, product, strategy, technology, behavior, or market innovation. The organizational context refers to the characteristics and resources of the organization, linking structures between employees, communication between organizations, size of the organization, and other resources that affect decision-making in the adoption of innovation (Baker, 2011).

Mozambique is considered a developing country in which industry, domestic and international trade, the consumption of goods and services, imports, and exports are constantly growing. More recently, the exploration of natural resources such as natural gas, coal, hydroelectric, and heavy sands have been putting the country in a promising future, attracting domestic and foreign investment and innovative technologies to address the challenges posed by industry, trade, and services.

Researching the relationship between IT expertise and innovation capacity can bring a positive gain for Mozambican organizations in terms of the benefit they must have, investing in IT to meet the needs of customers, partners, suppliers, and producers, among others. With this study we seek to answer the following research question: Does competence in Information Technologies impact the innovation capacity of Mozambican organizations?

The specific objectives are: i) Identify the IT competencies that influence the innovation capacity of Mozambican organizations, ii) Evaluate a structural model capable of relating IT competencies with the innovation capacity of Mozambican organizations.

In terms of structure, in addition to the introduction, the work has the theoretical foundation, methodological procedures, research results, discussion of research results, and final considerations.

2. Literature Review

2.1 Competencies in Information Technology

IT expertise is essential to the organization if it encourages the viability of rare, not imitable resources and that novel resources created can create a real impact on IT investment. For Sambamurthy, Bharadwaj, and Grover (2003), IT expertise is the organizational foundation of IT resources, capability, and describing organizational capacity for IT-based innovation due to available IT resources and the ability to convert IT assets and services into strategic applications.

In a recent study carried out with Brazilian technology-based companies, Alves and Perez (2023) found a positive and significant relationship in relation to IT competence and value creation. According to the authors, to create value in their products and/or services for the market, technology-based companies seek to innovate to meet market demands and consequently obtain value gains.

According to Tippins and Sohi (2003), IT expertise is how the organization is recognized for practical use and manages information within the organization, including IT infrastructure. Represents the specialization of resources that indicate the organizational skills of understanding and using THE IT tools, processes necessary for market management, and consumer information.

IT expertise is one of the most critical competitive advantages due to its vital role in ensuring the flow of information about products and the financing profile (Malekifar et al., 2014). Organizational culture identifies key actors in the interaction between strategic workers, consumers, suppliers, and competitors.

2.2 IT Competency Frameworks

Much research has been diversifying over time, putting IT expertise in the spotlight to promote development. According to Table 1, it is possible to see, in summary, the components of IT competence and the context in which these components were identified.

Table 1. Elements of IT Competence

Elements	Search context	Authors
• Tacit knowledge of IT • Explicit KNOWLEDGE OF IT	Knowledge management	Bassellier, Reich and Benbasat (2001) Devece (2013)
• IT knowledge • IT Operations • IT Objects	Relationship between IT competence and organizational learning	Tippins and Sohi (2003)
• IT infrastructure capability • Capability of IT business coverage • Proactive IT posture	Relationship between IT capability and organizational agility	Lu and Ramamurthy (2011)
• IT integration • IT Flexibility	Relationship between IT competency and supply chain agility	Ngai, Chau and Chan (2011)
• IT infrastructure capacity • Capacity of it business breadth • Proactive IT posture	Relationship between IT competence and Human Resources Management (HRM)	Chakravarty, Grewal and Sambamurthy (2013) Nam, Lee and Lee (2019)
• IT integration • IT Flexibility	Relationship between IT competency and supply chain agility	Malekifar *et al.* (2014)

Source: Prepared by the authors based on the literature

In a theoretical essay, Guite and Perez (2019) developed an approach to the contours of IT competence and its dimensions based on the fusion of the ideas of two large groups of authors. A group of authors (Chakravarty et al., 2013; Lu & Ramamurthy, 2011; Nam et al., 2019) on the relationship between IT competence and organizational agility understand that IT competence was composed of the capacity of IT infrastructure, power of IT business coverage and initiative-taking IT posture.

Another group of researchers, such as Malekifar et al. (2014); Ngai, Chau and Chan (2011), relating IT competence and supply chain agility, understood that IT expertise reflects IT flexibility and IT integration capability. Alves and Perez (2023) analyzed IT competencies to support value creation in Brazilian technology-based companies. The authors successfully used a new dimension for IT competencies, called IT integration with the business.

Based on the different theoretical approaches to Information Technology Competence, we decided to adopt in this study a set of dimensions to assess IT Competence joining the two different and complementary visions, so we chose to bring together these ideas to form the dimensions of IT competence. Therefore, the five dimensions adopted in this study for IT competence are: IT infrastructure, IT's business-wide capability, IT's proactive stance, IT Integration, IT Flexibility.

IT infrastructure is the organization's ability to implement shareable platforms – a feature that captures how the organization is good at managing data management services and architectures, network and portfolio communication services, and application services (Lu & Ramamurthy, 2011; Nam et al., 2019, Cheng etal., 2023). IT's infrastructure provides an integrated global platform, forcing models and integrating data and processes that enable real-time information sharing (Sambamurthy et al., 2003).

IT's business-wide capability is the ability of the organization to manage and exploit IT resources to support and connect business objectives – a capacity that reflects the extent of IT use in clear IT strategic vision, IT business integration, and IT strategic planning, enabling understanding of the value of IT investment (Lu & Ramamurthy, 2011; Nam et al., 2019, Cheng etal., 2023).

IT's proactive stance is the organization's ability to research initiative-taking capabilities to embrace IT innovations or exploit IT resources to create business opportunities. A proactive IT stance measures what terms the organization strives to be current in if it constantly looks for new ways to improve its effectiveness in using IT and promotes a climate conducive to trying new ways to use IT. It also seeks to understand whether the current IT is necessary or needs to be replaced, among other aspects (Lu & Ramamurthy, 2011; Nam et al., 2019).

IT Integration has been described as the extension to which IS interconnects and shares distinct roles and parts of an organization, focusing on the use of IT to coordinate activities in design, logistics, procurement, manufacturing, development, and other essential elements of the organization (Malekifar et al., 2014; Ngai et al., 2011). IT integration is linked to the use of IT to coordinate activities, create knowledge exchange and cooperation, and create simultaneous plans. The capacity of IT integration helps in the integration of acquisitions and promotes its post-merger and acquisition performance (Benitez et al., 2018).

IT Flexibility is the ability to quickly and readily support and disseminate a wide variety of software, hardware, communication technologies, data, critical applications, physical techniques, and the human component of IT infrastructure (Byrd & Turner, 2000). Other authors believe that flexibility in IT is the ability of technological Is to adapt and increase radical changes in the business process and the market, given time, cost, effort, and performance (Malekifar et al., 2014; Ngai et al., 2011).

2.3 Capacity for Innovation

Innovation can be presented in diverse ways, and the most highlighted are the following: process or product innovation, radical or incremental, administrative, or technological, market innovation, organizational innovation, among others (Schumpeter, 1997; Tidd et al., 2005; Valladares et al., 2014; Wang & Ahmed, 2004, Humdan et al., 2023). This classification depends significantly on each author's vision and his contextual approach.

Innovation is the invention and implementation of the adoption of innovation is the assimilation of new products, services, or technologies (Damanpour, 1991; Damanpour & Wischnevsky, 2006). The emphasis on innovation studies is given to the organization's role in the sense that there can be no innovation without organization.

Afuah (1998), in turn, states that innovation is the use of new knowledge to offer products or customer service to meet their needs. It is a new way of inventing marketable products that do not part of the firm's strategy in the competitive context. In the context of this author, innovation is the conversion of an idea into a product or service that can be useful to the customer. Still, in the context of innovation, Sheng and Wong (2012) argued that it is the fundamental element in creating the sustainability of competitive advantage in organizations in response to the changes imposed by the client and business environment and capitalizing on the opportunities imposed by innovative technologies.

Teece and Pisano (1994) established the study of dynamic capabilities as a subset of the competencies that allow the company to create products and processes responding to market changes. Thus, Manthey et al. (2017) highlight that the capacity for innovation comprises new methods for managing the business in the workplace and in the relationship between the company and external agents, which may be a new product, service, technology, production process, structure, or administrative system.

Innovation can be present in a variety of ways, as highlighted previously, but Lawson and Samson (2001) suggested a model of innovation capacity which comprises a set of processes within the company, encompassing dimensions such as vision and strategy, harnessing the competence-base, organizational intelligence, creativity, and management of ideas, organizational structure and systems, culture and climate, and technology management.

Some authors such as Wang and Ahmed (2004) and Humdan et al. (2023) complement the idea of several authors and argue that organizational innovation capacity is characterized when the organization presents skills for product innovation, market innovation, process innovation, behavioral innovation, and strategic innovation.

Product innovation, much referenced in theory because of the previous success of the product, is associated with the success the sustainability of the business. It presents an excellent business opportunity in terms of growth and expansion in new areas, which stabilizes the organization in the competitive market (Tidd et al., 2005; Tiger, 2006; Valladares et al., 2014; Wang & Ahmed, 2004).

Market innovation – is linked to product innovation, according to Schumpeter (1997), and refers to the innovation of market research and its promotion and the identification of new market opportunities and the entry of new investors. In the same way that it can refer to market innovation when you have a product, but innovative marketing programs are adopted to promote products or services, leading the competitor to the new market or an existing market segment (Wang & Ahmed, 2004).

Process innovation – in many cases, it is considered a sub-element of technological innovation as a challenge for machinery innovation and production methods. Process innovation is regarded as introducing a new production method, a new management approach, and a modern technology that can be used to promote production and process management (Tidd et al., 2005; Valladares et al., 2014; Wang & Ahmed, 2004).

Behavioral innovation – can be individual, group, and management. It refers to the sustainability of the organization's behavior change in the face of innovation. Individually, each one behaves in a way in the front of change (Wang & Ahmed, 2004).

Strategic innovation – is the new form of gambling in the existing market/ business considering the failures in the positioning of organizations. Some organizations are limited in strategic innovation. They cannot operate changes in a timely and real-time because they feel at an advantage in their market strategy (Wang & Ahmed, 2004).

Wang and Ahmed's (2004) vision were considered more complete than the other authors (Humdan et al., 2023) when considering the behavioral, strategic, market, process, and product innovation for this research.

2.4 IT Competence and Innovation Capacity

The progress of technological innovation is endorsed in the development of the public elements of knowledge shared by all actors involved in a particular activity in the cumulative forms of expertise. It highlights the information that should be free for the actors in the technological process of innovation. On the other hand, there must be synergies between the sectors involved revealing technological externality (Dosi, 1988). This author advocates the link between scientific advances and technical opportunities in the emergence of innovation. Innovation can be technological or just innovation of the market in which technology is knowledge or component, a connection between components, processes, methods, and techniques that condition new products and services. In turn, the knowledge of the market is the knowledge of the distribution of channels, application of products, preferences, needs, and expectations of customers (Afuah, 1998).

The technological paradigm defines the needs to be fulfilled, scientific principles used, and material technology to solve technical-selective economic problems involving the technology of technological change. The development process does not occur through individual production but by establishing interrelated technological systems in a permanent interaction and evolution (Conceição, 2000).

Innovation is not necessarily the commercialization of the most significant competitive advantage in the technological state of the art of radical innovation but also includes the use of the smallest scale change in technological know-how (incremental innovation) (Tidd et al., 2005). On the other hand, technological innovation must be maximally enhanced in the organizational context. The decision-making process for innovation must be taken transparently, although it can be rigid. The internal characteristics of organizations impact the adoption of technological innovations (Freeman, 1995; Perez et al., 2010).

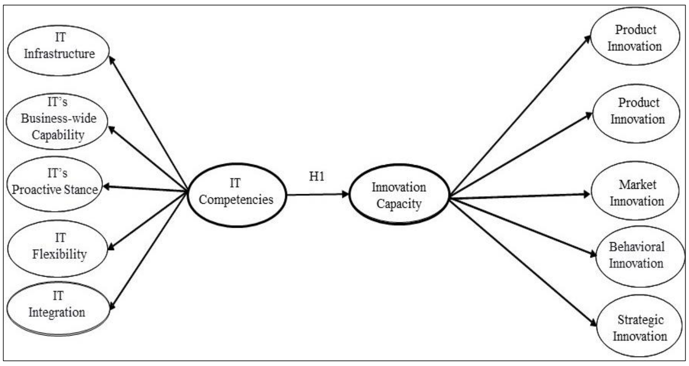
In the decision-making process, IT competence allows a more precise and complete number of information, both internal and external to the organization, to be accessed and analyzed in a brief period. IT competence reduces subjectivity with the proper use of IS (Albertin & Albertin, 2008). For IT expertise to impact innovation, the organization must have human resources, in critical sectors, with competence to encourage motivation. IT staff and their IT training positively impact innovative products and processes (Héroux & Fortin, 2018). A management team with strong IT expertise encourages IT strategy by communicating and articulating its vision of IT in innovation strategy. Based on these arguments, we formulate the following research hypothesis:

H1: IT Competence positively influences Innovation Capacity.

2.5 Research Model

The knowledge of how and for what the theoretical framework provides the rapid construction of hypotheses and good research results. In turn, the good relationship between variables provides an understanding of how the problem can be solved (Sekaran & Bougie, 2011, 2016). Faced with the challenges posed by the need to relate IT competence and innovation capacity, this research model was developed (Figure 1).

Figure 1. Types of innovation



Source: Prepared by the authors

As shown in Figure 1, the latent variables of first order are presented around the latent variables of 2nd order (IT competence and innovation capacity). This model was elaborated based on a literature review that provided information elucidating the broad contours of each construct.

3. Methodological Procedures

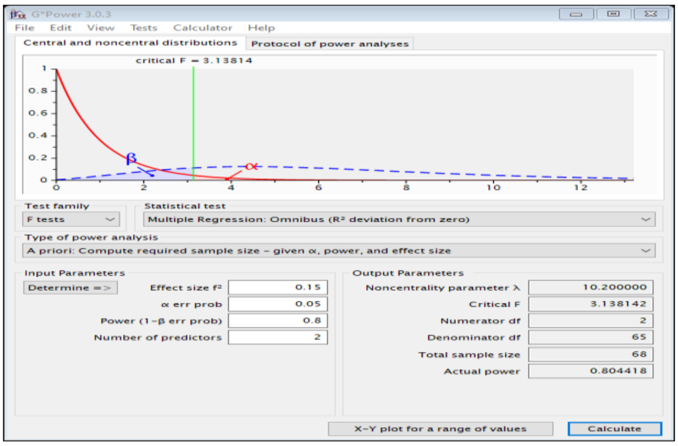
According to Creswell (2010), there are three research methods: quantitative, qualitative, and mixed. The research method and technique are similar, and the technique refers to the way data are obtained, and the methodology indicates the level of data analysis (Bryman, 1984). Of the two approaches of types of research, quantitative research was chosen in this study. The use of controlled variables through statistical analysis ensures observations to evaluate a theory, resulting in the study's objectivity. The relationship between variables is fundamental to testing hypotheses using a survey (Creswell, 2010).

Given the nature of this study, descriptive research is considered appropriate for this study. Descriptive quantitative research is a type of research that focuses on the collection and analysis of numerical data seeking to describe a specific phenomenon, variable or population. Descriptive research seeks to quantify the relationships between variables and provide an accurate representation of the data (Hair et al. 2019). Regarding the data collection instrument, we opted for a survey using an electronic questionnaire, as it is a versatile instrument frequently used in management research (Creswell, 2010; Freitas et al., 2000; Saccol, 2009).

For data collection, a questionnaire adapted by Lu and Ramamurthy (2011) in previous research and replicated by Nam, Lee and Lee (2019) was used to measure IT competence. The scale in these studies was a 7-point Likert scale; however, researchers such as Hair Jr. (2014) believe that a good scale presents equidistant points. For this reason, a 10-point scale was chosen. Furthermore, the instrument created by Lu and Ramamurthy (2011) only measured three sub-constructs of IT Competence (IT infrastructure, IT business coverage capacity, and IT proactive stance). For this research, the measure of IT competence approved by Guite and Perez (2019) was used, which, in addition to the three, also included IT flexibility and IT integration. The previously defined scales were translated from English to Portuguese, adapting the language to the Mozambican reality. To measure innovation capacity, we decided to translate the instrument used by Wang and Ahmed (2004).

For data analysis, partial least squares structural equation modeling was used using the Smartpls-3.3.2® software (software with a graphical user interface for Structural Equation Modeling (SEM) based on variance using partial least square modeling (PLS). PLS-SEM is a statistical technique that makes it possible to estimate complex models with causal relationships between constructs and which is consistent with research and data from human social relationships (Bido & Silva, 2019). According to Hair et al. (2019) the analysis is to test a theoretical framework from a predictive perspective; the structural model is complex and includes many constructs, indicators, and/or relationship models; the research is restricted to a significant sample of the population, in addition to the fact that the research needs latent variable scores for model analysis. GPower software, G*Power, 3.0.3®, was used to calculate the sample size and later use of the PLS (Figure 2).

Figure 2. Sample size calculation



*Source: G*Power 3.0.3 software screen*

In this case, it was necessary to observe two parameters: the power of the test (Power = 1 - β; β: type II error) must be greater than or equal to 0.8, and the average effect size should be f2 = 0.15 (Cohen, 1988) to be considered as a medium effect; the level of significance α = 0.05. The sample size resulted in 68 respondents for this research, as shown in Figure 2. To ensure the consistency of the model, we followed Bido and Silva (2019) and Ringle, Silva and Bido (2014), which suggest that the value be doubled or tripled to avoid the loss in data analysis, having chosen to duplicate, resulting in 136 responses. The survey was conducted in Mozambique, covering different organizations from May to October 2020.

4 Presentation and Analysis of Results

4.1 Sample Characterization

We collected the data using an electronic questionnaire sent by WhatsApp, Facebook, and e-mail to employees from different Mozambican organizations, other activity areas, and various positions. The total return obtained was 141 completed questionnaires. Due to the inconsistency of the answers (duplication of responses and the same option in all statements), the sample focused on 136 valid answers. The characteristics of the respondents can be shown in Table 2.

Table 2. Sample characterization (N =136)

Education	Area of activity

Average	29%	Education	11%
Superior	47%	Human resources	15%
Postgraduate studies	24%	Marketing	13%
Age of Organization		Finance and Accounting	15%
0 - 5 years	7%	Information Technology	13%
6 - 19 years old	29%	Engineering	8%
20 - 30 years	19%	Health	7%
More than 30 years	45%	Safety	8%
Number of workers in the organization		Administration	6%
1 – 9	6%	Research	4%
10 – 19	7%		
20 – 49	13%	**Position**	
50 – 99	20%	Teacher	12%
100 – 500	23%	Technician	47%
More than 500	32%	Administrative	10%
Sector of activity		Director	7%
Government	40%	Supervisor	10%
Industrial	12%	Manager	9%
Commercial	23%	Collaborator	5%
Services	25%		

Source: Survey data (2020)

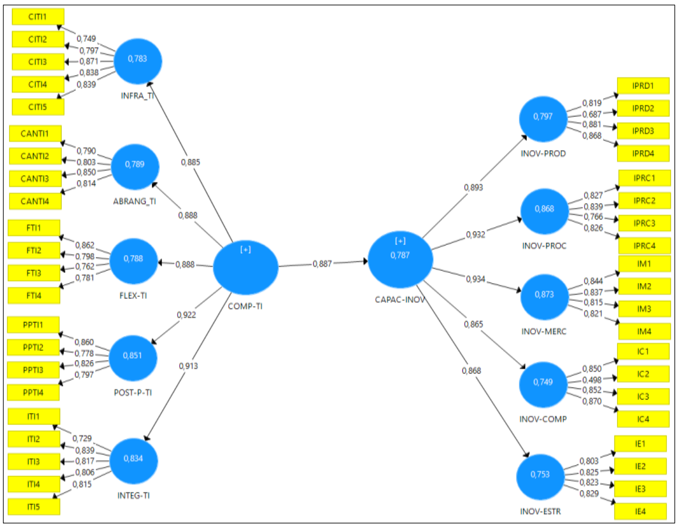
The data in Table 2 shows that 47% of the respondents have higher education, 29% have a middle education and the rest already have a graduate degree. In the same vein, 45% of respondents are from organizations that have existed for more than 30 years and about 75% of medium and large organizations. Regarding the sector of activity, 40% belong to government organizations, 25% from the service sector, 23% from the commercial sector and 12% from the industrial sector. As for the area of activity, human resources and accounting and finance with 15% each, have become more salient, followed by IT and marketing with 13% each, 47% of whom are technicians in these areas.

Due to the sample size, it was not possible to carry out a separate study to compare results between different Mozambican organizations, such as public and private ones. This was, in fact, one of the limiting factors of the research, since data collection took place during the pandemic caused by Covid-19. After the characterization of the sample used in the survey, the structural model with path coefficients generated based on the PLS is presented for the validation of the results using the measurement model and structural model.

4.2 Evaluation of the Research Measurement Model

Starting from the general model of the research and using the software SmartPls-3.3.2® (Ringle, C.M., Wende, S., Becker, 2015) was generated the path model (Figure 3). From the data in Figure 3, we can see the coefficients of paths between indicators and constructs and between constructs of 1st order and 2nd order. On the other hand, within the latent variables one can see the size of the effect of the indicators on the construct and the constructs between them. To better understand the data contained in the model and, because it is a reflexive measurement scale, the composite reliability, convergent validity, reliability of the indicator and discriminant validity were analyzed (Hair et al., 2019; Hair Jr. et al., 2017; Nascimento & Macedo, 2016; Ringle et al., 2014).

Figure 3. Model of relation paths between IT competence and innovation capacity



Source: Survey data (2020)

The factor loadings of the indicators are above 0.708 except for two indicators that correspond to product innovation and behavioral innovation. Table 3 shows the discriminating validity (diagonally) the composite reliability, the average variance extracted (AVE) and the correlations between the constructs of the 1st order represented in the model.

Table 3. Correlations of 1st order constructs in the relationship between IT competence and innovation capacity

	1	2	3	4	5	6	7	8	9	10	
1 - ABRANG-IT	0,815										
2 - FLEX-IT	0,731	0,802									
3 - INFRA-IT	0,746	0,714	0,820								
4 - INOV-COMP	0,653	0,648	0,577	0,783							
5 - INOV-ESTR	0,652	0,658	0,670	0,694	0,820						
6 - INOV-MERC	0,701	0,752	0,661	0,754	0,772	0,830					
7 - INOV-PROC	0,718	0,776	0,621	0,793	0,735	0,843	0,815				
8 - INOV-PROD	0,702	0,767	0,669	0,678	0,702	0,812	0,809	0,817			
9 - INTEG-TI	0,729	0,805	0,732	0,775	0,753	0,780	0,786	0,744	0,802		
10 - POST-P-TI	0,817	0,766	0,757	0,730	0,739	0,787	0,798	0,805	0,818	0,816	
Comp.Reliability	0,888	0,878	0,911	0,859	0,892	0,898	0,888	0,889	0,900	0,888	> 0.7
AVE	0,664	0,643	0,672	0,613	0,673	0,688	0,664	0,668	0,643	0,666	> 0.5

Source: Survey data (2020)

Note 1: Diagonal values correspond to the square root of the AVE
Note 2: All correlations are significant at 1%

According to Table 3, the values of composite reliability are between 0.859 and 0.900, revealing the existence of high consistency of the relationship between latent variables. According to Hair et al. (2019), Hair Jr. et al. (2017) and Nascimento and Macedo (2016) in the surveys, in general, these values should be between 0.70 and 0.90 contrary to exploratory research in which these values are considered reliable between 0.60 and 0.70. Regarding convergent validity (Table 3) the Values of the AVE range from 0.613 to 0.688 and are above 0.5 demonstrating its strong existence (Hair et al., 2019; Nascimento & Macedo, 2016; Ringle et al., 2014).

Also, the data in Table 3 on the diagonal can be noted the discriminant validity values that correspond to the square root of the AVE according to the criterion of Fornell and Larcker (1981) and Hair Jr. et al. (2014) . The values of the correlations between the latent variables are, in general, lower than the discriminant validity value. However, five values (in red) in Table 3 are higher in relation to their discriminant validity. This difference is not significant ranging from 0.2% to 1.9% leading to the conclusion that there is discriminant validity between the latent variables of the 1st order (Bido & Silva, 2019; Cohen, 1988; Hair et al., 2019; Hair Jr. et al., 2017; Nascimento & Macedo, 2016; Ringle et al., 2014).

At the level of the items, the values are above 0.708 except for two indicators that have 0.4981 (CI2) and 0.6870 (IPRD2) respectively (Figure 3). The values above 0.708 are justified by the need to rise squared and the result to be greater than 0.5 revealing how the variation in the item is explained by the construct, that is, the variation of the item in the construct should be explained in 50% or more, consubstantiating the average variance extracted from the item. As the composite reliability is greater than 0.7 and the AVE is greater than 0.5 the elimination of indicators with low factor loadings does not significantly influence the data and may impair the validity of the content. In addition, according to Bido and Silva (2019):

> By eliminating many indicators of measurement, other problems can occur: chance capitalization, raising doubt about the replicability of results in a new sample, makes it impossible to compare with the results of other studies and impairs the application of the scale in future studies... (Bido & Silva, 2019, p. 501).

Because of the reasons mentioned, it was decided to keep all indicators, regardless of their factor loads, not significantly affecting the search results. At the level of the constructs of the 2nd order the situation becomes a little different so that the only value of the correlation between IT competence and innovation capacity is higher in relation to the discriminating validity values protruding diagonally from Table 4.

Table 4. Correlations of 1st order constructs in the relationship between IT competence and innovation capacity

VL 2nd Order	CAPAC-INOV	COMP-IT
CAPAC-INOV	0,863	
COMP-IT	0,887	0,834
Comp.Reliability	0,967	0,958
AVE	0,745	0,696

Source: Survey data (2020)

Note 1: Diagonal values correspond to the square root of the AVE
Note 2: All correlations are significant at 1%

Nevertheless, the diagonal values were recalculated exactly to differentiate them from the values obtained in the discriminant validity of the constructs of the 1st order that were much lower. The difference between the discriminant validity values and the correlation values does not prevent the validation of the model as it is in the order of 3%, so it is not significant to change the results, according to Hair et al. (2019), Hair Jr. et al. (2017), Nascimento and Macedo (2016) and Ringle, Silva and Bido (2014).

4.3 Evaluation of the Structural Model

After the analysis of the measurement model, the characterization of the structural model is followed. In this case, the statistic "t" to evaluate significance levels are presented; "R2" (Pearson's coefficient of determination); predictive relevance "Q2" (Stone-Geisser prediction indicator) and effect size "f2" (Cohen indicator).

The results indicate a value of R2 = 0.787, i.e., IT competence explains the variance of innovation capacity by 78.7%. For Cohen (1988, p.532) the R values are 0.1; 0.3 and 0.5 considered: low, medium and high, respectively. In turn, the values of R2 = 0.01 as the lowest effect; 0.09 as the average effect and 0.25 as the greatest effect.

In social and environmental sciences, R2 assumes values of 2% as the lowest effect, 13% as a mean effect and 26% as the greatest effect (Cohen, 1988; Ringle et al., 2014). In the same sequence, Hair et al. (2019) understands that values of 0.75, 0.50 and 0.25 are considered to have a higher, medium and weaker effect, respectively, and values above 0.90 are considered typical indications of excessive adjustment. Taking into account the ideas of Cohen (1988) and Hair et al. (2019) , the values of R2 this research are strong in the explanation of the other constructs because they are almost all equal to or greater than 0.75 and less than 0.9.

The IT competence has a significant direct effect (0.887) on innovation capacity as $p < 0.05$ (Table 5). It is concluded that IT competence positively impacts innovation capacity (Bido & Silva, 2019; Ringle et al., 2014).

Table 5. Evaluation of the structural model

Structural relationship	f^2	Coefficient	Standard error	*Value-t*	*-P-value*	R^2	Q^2
CAPAC-INOV -> INOV-COMP	2,984	0,865	0,029	29,717	**0,000**	0,749	0,451
CAPAC-INOV -> INOV-ESTR	3,052	0,868	0,031	28,305	**0,000**	0,753	0,497
CAPAC-INOV -> INOV-MERC	6,851	0,934	0,012	75,233	**0,000**	0,873	0,595
CAPAC-INOV -> INOV-PROC	6,568	0,932	0,016	59,249	**0,000**	0,868	0,570
CAPAC-INOV -> INOV-PROD	3,932	0,893	0,023	38,497	**0,000**	0,797	0,522
COMP-IT -> ABRANG_TI	3,741	0,888	0,027	32,921	**0,000**	0,789	0,516
COMP-IT -> CAPAC-INOV	**3,689**	**0,887**	**0,018**	**48,230**	**0,000**	**0,787**	**0,413**
COMP-IT -> FLEX-IT	3,710	0,888	0,025	36,052	**0,000**	0,788	0,494
COMP-IT -> INFRA_TI	3,605	0,885	0,025	35,770	**0,000**	0,783	0,522
COMP-IT -> INTEG-IT	5,032	0,913	0,021	44,167	**0,000**	0,834	0,521
COMP-IT -> POST-P-TI	5,705	0,922	0,013	68,446	**0,000**	0,851	0,559

Source: Survey data (2020)

Cohen's coefficient (f2) ranges from 2.984 to 6.851. Considering that if f2 = 0.02 is considered small; f2 = 0.15 is considered average and f2 = 0.35 is considered large, it can be inferred that constructs are very important for the overall adjustment of the model because the values of f2 are above 0.15 (Bido & Silva, 2019; Cohen, 1988; Hair et al., 2019; Hair Jr. et al., 2017; Nascimento & Macedo, 2016).

The "t" values estimated by bootstrapping with 5000 repetitions range from 28,305 to 68,446 therefore, higher than 1.96 with a significance level of 0.05 and a 95% confidence interval which leads to the conclusion that the internal model loads are highly significant (Bido & Silva, 2019; Hair et al., 2019; Hair Jr. et al., 2014, 2017).

Using the blindfolding procedure, a distance omission of seven and the innovation capacity (endogenous construct) chosen to perform the algorithm it was possible to obtain the Q2 or Stone-Geisser indicators. These values range from 0.413 to 0.595 and, according to Hair et al. (2019) values higher than 0, 0.25 and 0.50 indicate small, medium and great predictive relevance of the model in relation to endogenous latent variables. It is concluded that there is a great predictive relevance, since the data are, on average, above 0.50 being only four indicators that are below, but close to this value, in a universe of 11 (Hair et al., 2019; Hair Jr. et al., 2017; Nascimento & Macedo, 2016).

With the analysis of the measurement model as well as the structural model, we concluded that the proposed research model is valid to achieve the objectives previously outlined considering the validity of the instrument of data collection used.

5 Discussions of Results

In this research, we theorized that the variation in innovation capacity could be explained by IT competence. The IT expertise reflects IT infrastructure capability, IT business reach capability, initiative-taking IT posture, IT flexibility, and IT integration (Guite & Perez, 2019).

In the relationship between IT competence and innovation capacity, the results revealed a positive influence of IT competence on the generation of ideas, products, services, strategies, and innovative behavior. The research instrument developed by Wang and Ahmed (2004) adapted to this research proved to be replicable to different realities. IT enables organizations to follow development through innovation of products, services, strategies, markets, and behavior to facilitate the decision-making process by using information sharing in an appropriate and detailed way, competitively generating innovation, according to Perez et al. (2010), Campos Filho (1994), Albertin and Albertin (2008).

Given the heterogeneity of respondents, the results revealed that the use and training in IT have a significant impact on the adoption of innovation by organizations, especially those that use electronic services such as health, commerce, and financial services, among others. It is necessary that qualified and trained personnel with adequate equipment for any innovative service presented to them.

The hypothesis established using the theory was empirically proven. IT expertise positively influences innovation capacity. The more competent organizations are, the more likely they are to be able to innovate (Albertin & Albertin, 2008; Campos Filho, 1994; Perez et al., 2010; Ravichandran, 2018; Ravichandran & Lertwongsatien, 2005).

6 Final Considerations

With this study we seek the answer to the following question: Does competence in Information Technologies (IT) impact the innovation capacity of Mozambican organizations? The results indicate that Information Technology expertise influences the management of the organization. In this context, its study contributes significantly to assessing the skills required in IT to manage information within the organization or between organizations and provide a response to the challenges imposed by the market in event monitoring, reengineering, and management tools for business process automation.

The organization must be prepared for innovation. In Mozambique, so an organization can have the capacity to innovate products, services, processes, strategy, behavior, and market, it automatically must be competent in IT. Being skilled in IT requires the existence of human resources qualified to use the most up-to-date technological resources, with more appropriate tools to monitor the development, both of organizations and of the technology that these same societies employ in daily life.

To introduce a new production method, a new management approach, and recent technology that can promote the production and management of processes, IT competence positively influences the reconfiguring of the necessary technical and technological resources to achieve these objectives. In the same way as a new product, it must present a specific characteristic that differentiates it from other products to inspire the final consumer. Nowadays (decade of 2020), this particularity is only possible with the use of the technology provided by an IT infrastructure prepared to achieve organizational objectives previously outlined, in this case, a new product. Creating a new product implies innovating in the organization's market, identifying new market opportunities, entering new investors, and adopting new strategies to exploit these opportunities.

Organizational behavior only achieves a certain degree of innovation when the previous patterns of corporate culture are broken. The transition from using certain services with manual and mechanical resources to using technological means is achieved more with IT. For this process to occur, there needs to be an IT investment adjusted to the need to change a particular way of thinking for organizational thinking that can provide the organization's survival in the competitive environment.

The IT expertise positively influences the new form of gambling in the market to circumvent existing failures by developing competitive strategies to create organizational value by operating real-time changes. This research detected empirical evidence that IT competence influences organizations' innovation capacity, implying that they need to invest in developing their IT expertise. Executives who invest in the development of IT expertise create value for the organization, adding reasons for organizational growth and the change in an innovative culture. The capacity for innovation is a factor that depends on the strategic incentive of leaders to understand what is required for the organization to succeed at all levels.

This study is expected to open a discussion and theoretical advances to generate a holistic understanding of the dynamics and contradictions of the relationship between IT competence and innovation capacity in Mozambican and similar organizations. The research took place during the period when Mozambique and the world were being endowed by the pandemic caused by COVID 19. In this sense, it is proposed that the same study be conducted after the pandemic, after many face-to-face activities, to understand the possible limitations in understanding the usefulness of IT competence and its impact on innovation capacity. We proposed replicating it in other African countries with a different culture from Mozambique and a different level of development.

The study did not distinguish between public and private organizations, which may have influenced the research results. It is recommended that future research takes this comparison into account. The statistical data analysis was made using PLS-SEM respecting its characteristics and limitations. Other statistical analysis techniques can be applied in similar studies that can deepen the analysis increasingly.

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