



Research Article

# The Study of the Contribution of Innovation in Information Technology to Performance in Moroccan Companies

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## Abstract

The massive use of information technology (IT) in companies in recent years has become a major concern for researchers and management science professionals. As they seek to identify the variables that can explain the contribution of IT to performance, they agree that investment in IT alone is no longer a source of sustainable and non-substitutable competitive advantage. In this context, multiple attempts to model the impact of IT on performance have led to mix and sometimes contradictory results. This study, which aims to emphasize the role of IT innovation as a mediating variable between IT use and performance improvement, confirms the existence of a correlation between this variable and performance and whose results imply the need for an urgent digital transformation of Moroccan companies. It was part of a dynamic effort to identify the variables that can appropriate the value of IT investments for high performance. To this end, we initially presented a literature review that identified the main theoretical advances modelling the relationship between IT and performance, as well as the impact of IT innovation on this relationship. We then presented the methodology adopted and discussed the main results obtained.

**Keywords:** Performance; information technology; innovation; management instruments

## Introduction

The omnipresence of IT in the life of companies and individuals does not cease to problematize their use in the service of the performance of organizations. IT, which appears in different types depending on its intended use (infrastructure use, transactional use, informational use, decision-making use) (Aral

and Weill, 2007), has undergone continuous development and is giving rise to the emergence of a highly competitive market based on innovation. This IT innovation is raised, on the one hand, by the digitalization movements that are invading the economic and social environment of companies, and on the other hand, by their contributions to performance as a source of a sustainable competitive advantage (N.

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Melville and al., 2004; Powell and Dent-Micallef, 1997).

This study is part of the work that seeks to explore the variables that can appropriate the maximum value of IT investments for high performance, retaining IT innovation as a mediating variable between IT use and performance. Through this study, we seek to explore, first, the explanatory variables contributing to the emergence of IT innovation in Moroccan companies, and this by assessing the situation of such innovation and its ability to accompany the requirements of digitalization. Secondly, through the analysis of the use of IT, we will try to study the contributions of IT innovation to the performance of these companies. These objectives will allow us, thereafter, to bring more clarifications to the questions raised by the professionals with regard to the appropriation of the value of their IT investments. For that, we will identify our problem through the following research question: « **To what extent does innovation in information technology contribute to the performance of Moroccan companies?** »

To carry out this investigation, we will start with a conceptual analysis in order to identify the main contributions of the theories that have studied the relationship between IT and performance, on the one hand, and the return of IT investments, mainly in IT innovation, for companies. Next, we will present the methodology adopted, namely the multiple case study method which relies on semi-structured interviews as a data collection technique. We will then discuss the results obtained using the tools offered by NVIVO software. At the end of our work, we conclude with the presentation of the main limitations of the present study and the research prospects that could be derived from the results of this work.

### **Theoretical and conceptual framework**

The advent of IT was accompanied by a debate among researchers on its contributions to the performance of organizations. Such a debate is focused both on the profitability of investments in these technologies and on their abilities to create a sustainable competitive advantage. A review of the literature in this area yields conflicting results, some of which, such as Menon and al (2000) and Devaraj and Kohli (2003), supported the idea of IT contribution to performance improvement, while others, such as

Barua and al (1995), rejected any relationship between these two variables.

In what follows, we will first present the main advances in the literature on the impact of IT on performance, with a view to highlighting the explanatory variables of this impact. Next, we will take stock of IT innovation by specifying the main aspects that characterize this innovation in the literature.

### ***IT and performance: a literature review***

A review of the literature on the impact of IT on performance yielded mixed and contradictory results. Such results make this topic ripe for further investigation and analysis in order to provide answers to the question of the contribution of IT to performance improvement.

#### **➤ Economic approach**

For those who take an economic approach, assessing the impact of IT on performance means studying the relationship between IT investment and productivity. Brynjolfsson and Hitt (1996) demonstrated the productivity improvement induced by IT investments, through the increase of the marginal product in the production function.

#### **➤ Social psychology approach**

The marginalization of the human aspect in the economic approach gives rise to the social psychology approach which considers psychosocial factors. Such factors represent one of the determinants of the success of technology in the organization (Davis, 1989; DeLone and McLean, 1992, 2003), as well as users' attitudes and behaviors towards technological innovation, which are introduced as explanatory factors for the acceptance and, consequently, the success of IT investments.

#### **➤ Competitive analysis approach**

Competitive analysis links the impact of IT on performance to its ability to achieve a competitive advantage. This approach thinks the IT as a strategic weapon (Parsons, 1983). As stated by Parsons (1983), Ives and Learmonth (1984) and Porter and Millar (1985), the contribution of IT to competitive advantage takes various forms, namely, the modification of the product life cycle, the change of distribution modes, the improvement of organizational practices and the offering of products or services

different from those of its competitors. IT provides better internal and external integration that allows the company to visualize cost sources and differentiation events that are key to a successful competitive strategy.

#### ➤ **Strategic alignment approach**

According to Henderson and Venkatraman (1994), strategic alignment consists of seeking, among other things, coherence between strategies and strengthening the links between a series of dimensions (structures, organizational processes and IT). Such coherence consists of achieving functional integration, on the one hand, between the company's strategy, its structure and its organizational processes, and, on the other hand, between the IT strategy, the infrastructure and the IT processes for the alignment of the IT strategy on that of the company.

#### ➤ **Process-oriented analysis**

On the basis of the criticisms of the economic approach, another process approach is emerging. This approach starts from the fact that processes encompass all conceptions of organizational performance. Lorino (2003) specified that the impact of IT must be evaluated at the level of organizational processes to know the different uses of ICT (information and communication technology). Soh and Markus, (1995) for their part, proposed a model describing the link between IT, the organizational process and performance. According to the same authors, this articulation consists in the implementation of three types of processes fed by an ICT system. The first is the conversion process (the transformation of ICT spending to technology assets), the second is the process of using the ICT infrastructure and the third is the competitive process. The latter is the process that allows, through efficient use, acquiring a competitive advantage and leads, therefore, to an improvement of the organizational performance.

#### ➤ **Resource-Based Analysis**

This approach is based on an articulation between three company resources that complement each other in order to enhance the value of IT resources and to achieve a competitive advantage that guarantees the improvement of the company's performance, namely human resources, business resources and technological resources (Powell and Dent-Micall, 1997). It remains the most dominant

approach in the literature analyzing the contributions of computer artifacts.

The results of the above analyses show that the impact of IT on performance does not lie in IT investments alone but in their use. In other words, the appropriation of the value of IT investments is the result of complementarity between them and organizational and human resources.

#### ***IT Innovation and company performance***

In trying to understand innovation, we are faced with multiple definitions seeking to conceive a concept that has become a massively used variable in different fields, both as an independent, dependent and mediating variable. Gregory M. Rose (2015) defined innovation as something new that has occurred for the relevant actor, namely, the actor of interest (a person, organization, or industry) that has identified, acquired, and adopted an object that allows it to perform a new action that was not possible before the adoption of that object. For the author, innovation is a product of learning specific to the actor and not to the object or objects.

For companies, innovation is often sought for high performance. Within this framework, Birkner and Mahr (2016) presented a modern conception of innovation as the ability to do things in a different way. Similarly, Reaiche et al. (2016) recognized innovation as something new that can generate value and helps create the potential of a company. Thus, innovation can be a critical economic catalyst for increasing profitability and business value (Naidoo and Hoque, 2018).

IT Innovation refers to innovation within a set of objects that facilitate the acquisition, storage, processing and delivery of information. Gregory M. Rose (2015) distinguished between three broad categories of innovations, IT: service, base, and processes. The three categories of IT innovations are understood from the prospect of IT development actors such as software development companies (Lyytinen and Rose, 2003). As far as service innovations are concerned, they are those consumed by the end users of the products generated by the IT development actors. These innovations include all of IT, but specific, as they are adopted by end users. As far as the IT base innovations are concerned, they are fundamental innovations that allow the creation of services. They include software languages, architectures, hardware

platforms, models and standards. Finally, process IT innovations are new methods of creating service IT innovations from basic IT innovations.

IT innovation is often seen as a mediating variable between information technology and performance companies. Pérez-Lopez and Alegre (2012) suggested the importance of finding relevant organizational capabilities that serve as important mediators between IT and performance. Their results show that innovation can mediate the relationship between capability-IT and company performance. The results of the literature confirm that IT is necessary, but not enough to enable a significant and sustainable competitive advantage. The researchers also noted that IT capability, complemented by organizational culture, drives innovation leading to company success.

After the trivialization of IT through imitation and substitution movements, we have witnessed an orientation of researchers towards the use as a mediating variable between IT and the performance of organizations. Such behavior has its origins primarily in resource theory, which has identified IT as a resource to be combined with other complementary organizational and contextual resources in order to appropriate their values (Lethiais and Smati, 2009). Within this framework, Kmiecik et al. (2012) state that the causes of sustainable competitive advantage lie in a variety of IT-related resources and skills that combine to develop an IT capability. Such capacity demonstrates VRIN characteristics (value-creating, scarce, hard-to-imitate, and non-substitutable resources and skills: Valuable, Rare, Inimitable and Non-Substitutable (Franck B et al. 2015)).

The search for mediating variables among IT and performance continues to accelerate following the increased professionals' focus on IT. According to Chae et al. (2018), IT contributes to

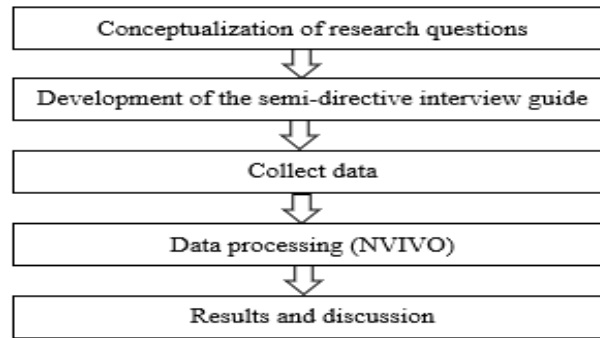
innovation in the company by producing a variety of new products and services, which are a source of high performance and profit. In the same way, the same authors specify that IT allows companies to become the leaders of their sectors through the provocation of sustainable competitive advantage in various sectors. According to Sirilli and Evangelista (1998), companies increase their performance by adopting IT. Finally, we can say that IT innovation, and unlike non-technological innovation, has a more significant influence on the performance and success of the company by incentivizing non-technological innovation (Ryu, 2016).

### **Methodology and sample**

In this qualitative study, we will adopt a methodology based on multiple case studies (Yin, 2009), and we use semi-structured interviews as a data collection technique. For data processing, we will use NVIVO software. The sample, thus, was constituted in accordance with the methodological guidelines recommended by the literature (Yin, 2009).

### **Methodology**

As we consider the multidisciplinary nature of our problematic, as well as that of the object of our research, we have adopted a qualitative approach in this study. It is an approach that seeks to develop true and relevant statements that can be used to explain the situation of concern or describe causal relationships of interest. It is an approach that provides researchers more liberty for intervention while remaining framed by standards of validity and reliability (Creswell, 2003). Based on the dynamics of qualitative research, we adopted the following process to begin our empirical investigation:



**Figure 1: Qualitative research process used**

Our choice of the multiple case study method is embodied in our desire to conduct a more robust study based on evidence from multiple cases, that appears to be more convincing (Herriott and Firestone, 1983), despite the drawback that it needed resources and is time-intensive (Yin, 2009).

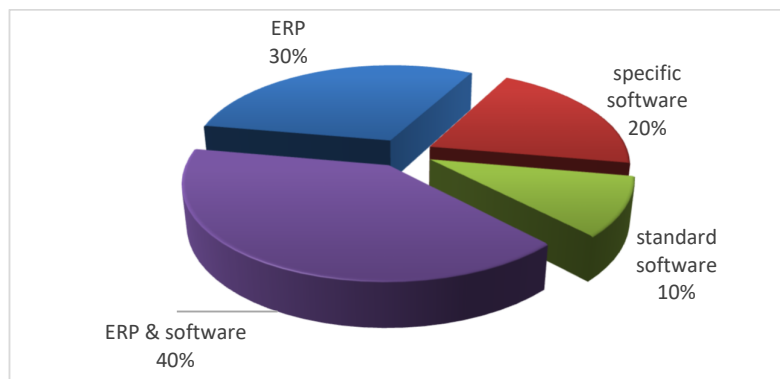
Among the many data collection techniques associated with the case study method, we adopted the semi-structured interview. For this purpose, we developed an interview guide with both closed and open questions, based on the subsidiary questions of our problematic, which are as follows:

- What are the determinants of IT innovation in Moroccan companies?
- What are the uses of performance-oriented IT in Moroccan companies?
- What are the correlations between IT and the performance of Moroccan companies?

#### **Sample**

For the selection of companies to be interviewed, we use the criteria recommended in the literature (Yin, 2009), notably that of ease of access and the availability of people to be interviewed. The selected sample is composed of ten companies of different sizes and activities and 23 interviewees and includes two categories of companies. The first represents companies with advanced IT infrastructure and characterized by the full or partial implementation of a BI system (such as ERP, Datawarehouse, BI), in order to study the existence of IT innovation and its correlation with the performance of these companies. The other category includes companies with a low level of digitalization, selected in order to study the explanatory variables of such a situation.

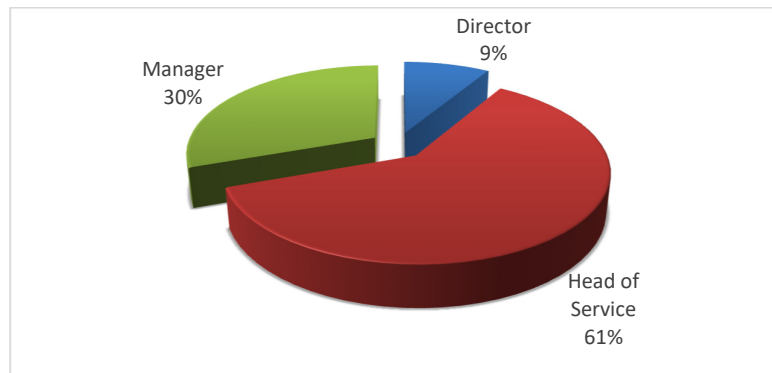
The following graph shows a breakdown of the companies surveyed according to the nature of the IT solutions adopted:



**Figure 2: Distribution of companies according to the type of IT solution adopted**

In each company, we made sure to contact the managers as interviewees. This choice is due to their importance in the IT implementation process, as well as their primary role in

performance management. Interviewees are selected based on their availability and consent to participate in our interviews (Yin, 2009). We made sure to achieve inter-case saturation despite the access constraints we encountered.



**Figure 3: Classification of respondents according to their status in the company**

The selected interviewees have multiple characteristics: some are common to most managers (such as the level of initial education and type of training), and others are specific to each (such as their managerial experiences or with the use of IT).

### Results

Despite the evolution of the IT market in Morocco, the results of this study show a weak presence of IT innovation in the IT strategies of the companies surveyed. The IT strategies of the majority of the latter are oriented towards the acquisition of IT solutions in the absence of innovative IT structures. The presentation of the results of this study will be done using the tools offered by the NVIVO software, mainly graphs, crossover matrices and clusters of nodes associated by the Pearson correlation coefficient "r" in order to study the degree of correlation between the variables.

In what follows, we will begin with a diagnosis of the state of IT innovation in the companies surveyed in order to subsequently identify the determinants of an innovative IT structure. Finally, we will study the degree of correlation of this innovation with the performance of companies.

### *A weak trend toward IT innovation*

The results show a weak orientation of the companies towards the implementation of an innovative IT structure. This appears clearly by analyzing the components of the said structure which consists, in the best case, of three variables, namely:

### **The nature of the implemented IT-solution**

The IT structure of the companies surveyed allows us to distinguish between three categories of IT solutions:

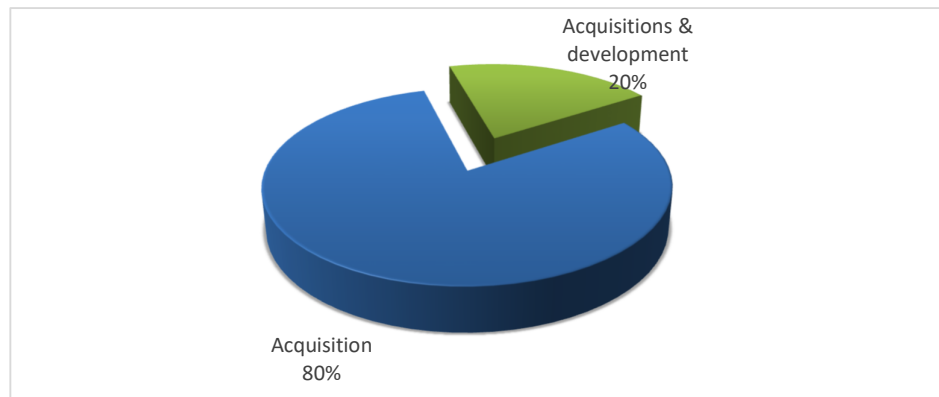
- **The integrated software packages (ERP)** which constitute a software package, shortened in English ERP for "enterprise resource planning", is, according to the wide terminological dictionary, a « *software which makes it possible to manage the whole of the processes of a company, by integrating the whole of the functions of this last one* » (Quebec Office of the French Language, 2020);
- **Specific software** that is a custom solution developed for a specific customer (Engineering and Engineering, 2008);
- **Standard software** that represents a solution developed on the initiative of a

publisher and sold to many customers (Engineering and Engineering, 2008)

The analysis of the IT structure shows that 30% of the companies adopt integrated solutions (ERP). Such a situation shows the slowness in the process of modernization of the IT structure.

### The adoption Modality

Whether the solutions adopted are of the integrated type or not, we have observed that all companies have adopted these solutions through their acquisitions. This situation reflects the low presence of innovative internal IT structures with the competence to meet their own needs.

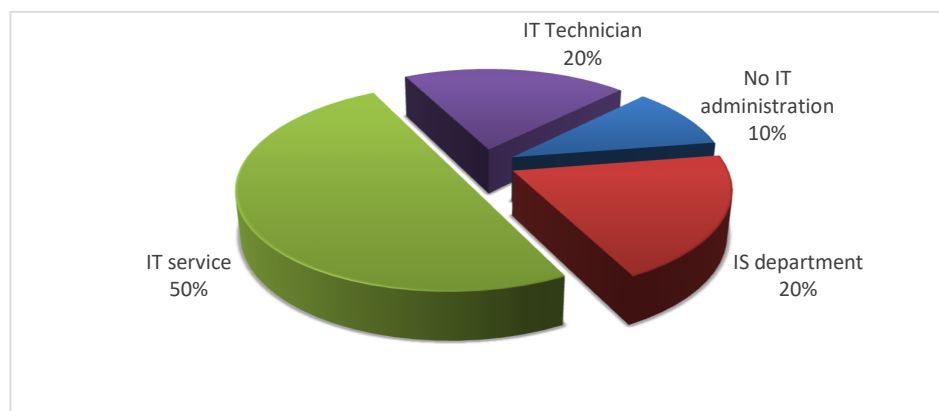


**Figure 4: Distribution of companies according to the nature of IT adoption**

The sample results in 80% of the companies resort to acquisition without any development effort, and the rest try to develop some applications to carry out limited activities and, sometimes, to realize links between solutions of different brands and that is dedicated to a limited category of internal users.

The other component of each IT structure is the administration of implemented solutions. Examination of the selected sample allows us to distinguish between four situations that reflect four levels of administration. The following graph illustrates the distribution of the selected companies according to their level of administration:

#### - The administration level



**Figure 5: Distribution of companies by the level of IT administration**

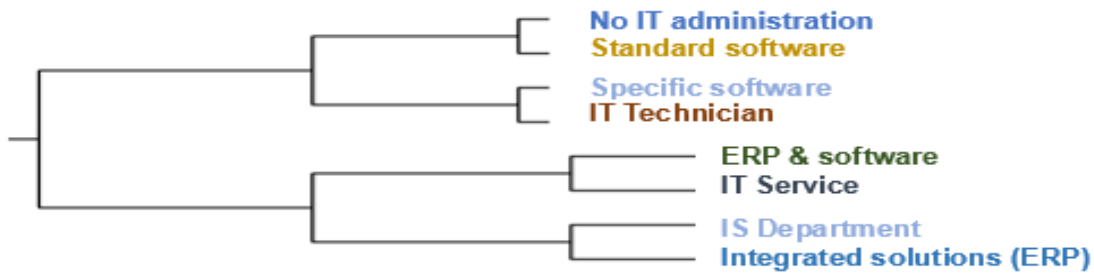
50% of the companies surveyed have an average level of administration in the form of an IT department, compared to 20% for those with a high level of IT department. This variable, which is highly correlated with IT innovation, widely explains the low importance of IT strategy in the overall strategy of companies.

**Determinants of an innovative IT Structure**

By analyzing the situation of the IT structure, we can list three determinants of an innovative IT structure. These are mainly IT administration, the nature of the company's structure, and the management approach practiced in the company.

**- The importance of modern administration**

The existence of a modern administration means that the company has the necessary IT and human skills to satisfy their IT needs and therefore innovate. It is on this variable that the quality of the IT adopted and the modality of adoption depends. Regarding the nature of IT, the results show a strong correlation (0.451243) between companies with a modern administration (IS department) and the adoption of integrated solutions such as ERP.



**Cluster 1: Correlation between IT type and IT administration level**

In terms of adoption modality, we found that companies with an IS department manage to develop some of their IT needs.



**Cluster 2: IT Administration and Adoption**

Despite the fact that the majority of companies opt for the acquisition of their IT solutions, we note the existence of an average correlation (0.314373) between the high level of administration (IS department) and the existence of development efforts for certain IT solutions. Such a situation expresses the tendency of some companies to invest more in IT innovation, through investment in IT human

resources (human resources with IT skills and experience) (Melville et al., 2004).

**- The necessity of flexible structures**

One of the determinants of the incentive to innovate in IT is the nature of the company's structure. In this context, hierarchical and family structures are a handicap to the establishment of an innovative culture in IT or in other



organizational and managerial aspects. While companies adopting more or less flexible structures find themselves oriented towards the

acquisition and development of skills, material and human, dedicated to IT innovation. The following crossover matrix reflects these results:

**Table 1: Impact of the Nature of the Structure on IT Adoption**

	ERP & software	Specific software	Standard software	Integrated solutions (ERP)
Centralized structures	3	2	1	2
Decentralized structures	1	0	0	1

This matrix shows the lack of harmonization of IT choices among companies with a centralized structure, in contrast to companies with a decentralized structure that are on the right track for digital transformation.

**- Domination of the top-down management (the family character)**

As far as the applied management approach is concerned, we distinguish two categories of companies: The first one adopts a classic and family approach (top-down) and the second one pursues a modern management style granting their managers a margin of freedom in the management of their activities. It is a necessary margin with which these companies encourage them to innovate in their functions.

**Table 2: Impact of the governance mode on the Choice of IT**

	ERP & software	Specific software	Standard software	Integrated solutions (ERP)
Top down management	1	2	1	1
Managerial management	3	0	0	2

From the results of this matrix, we find that modern management companies approve an orientation towards modernizing their IT structures by adopting integrated solutions, in contrast to traditional and family management companies (Donaldson, 2001). The latter are characterized by the monopolization of decisions by the management and weak coordination and functional communication. In such an environment, it is difficult to provoke the emergence of innovation initiatives, while limiting the development of managers' skills.

***Correlation between IT Innovation and Performance***

Despite the efforts made by some of the companies in our sample to develop their IT skills and innovation, this remains above the requirements of the digitalization movements. The strong correlation found between integrated IT solutions and use for performance monitoring

and evaluation in the surveyed companies points to two findings:

- Firstly, integrated solutions are the result of a modern and innovative IT structure. In this context, Amoako-Gyampah (2007) argues that integrated solutions allow the synchronization of all the activities of the organization by promoting the elimination of multiple sources of data, the provision of more accurate and timely data and the facilitation of information flows and communication between different internal and external actors; this reflects the relevance of information generated by this type of solution. This relevance has a direct impact on the company's performance.
- Second, the dominance of companies adopting non-integrated or partially integrated solutions. This situation,

which characterizes the majority of the companies surveyed, shows the absence of IT innovation and, consequently, a weak impact of their IT use on their performance.

From these results, we can conclude that, despite the efforts undertaken by some companies to modernize their IT structures, they remain unaware of the importance of IT innovation as a determinant of the performance of their IT structures. Such a structure is capable of producing high-quality information and supported by good quality service (Delone and McLean, 2003), which is a source of sustainable competitive advantage (Tippins and Sohi, 2003; Andrej Bertoneclj, 2010; Barney, 1991).

### Discussion

The above results show a weak trend to the IT innovation. This is reflected in a strong correlation between the use of traditional IT (standard software) and the low level of automation of performance management tools and measures. This situation reflects the weak orientation of the surveyed companies to IT investment and, consequently, the weak correlation between IT innovation and their performance. This weak correlation found can be analyzed with respect to two levels:

**The IT innovation situation:** this is a situation that approves that IT innovation should be sought, mainly, in the type of IT solutions adopted and in the IT administration function (Zhang and al., 2019). As a result, companies moving towards the acquisition and development of IT solutions, integrating the majority of their business processes, are starting to implement an innovative IT structure. On the other hand, others who continue to use traditional solutions are far from joining the IT innovation scene and depend on external IT developers. Within this framework, we have noted the absence of a well-founded IT strategy in this category, which comes from the:

- Implemented IT solutions, which are still of the classic type or which do not manage to achieve total integration in the case of;
- Lack of consistency between IT solutions and business needs;
- The low involvement of managers other than management in the implementation process;
- And the low budget allocated to the modernization of IT infrastructure;

**Reduced use of IT:** this is a use that is widely limited to the production of performance management tools, such as management charts, costing and budget forecasting. This type of use reduces the maximum appropriation of the value of IT investments and therefore limits their contribution to company performance. Today, IT innovation is not limited only to the production of the management instruments, but also targets the communication aspect, vertical, horizontal coordination and the strengthening of control, storage and intelligence tools, such as BI (business intelligence) and Data Warehouse (Zhang et al., 2019).

### Conclusion

At the end of this study, we can say that IT innovation in Moroccan companies remains below the requirements of the economic and social environment. This is mainly due to the dominance of family-owned SMEs. They continue to ignore the importance of IT investment. This category of company has rigid hierarchical structures that limit the creation of an innovative culture. Today, innovation is no longer a choice (Hanaysha et al., 2022), it has become an obligation for Moroccan companies to compete on an international scale. This innovation must be global and must touch all aspects of the company, notably the organizational, technological, and managerial aspects.

Despite the fact that our research has some limitations, mainly related to the difficulties encountered in the constitution of the sample, these results open up avenues for future research on various organizational aspects of the company, such as the study of the process of emergence of innovation in companies (longitudinal study), the study of the impact of technological innovation on non-technological innovation, as well as the development of a conceptual model for the establishment of an innovative culture in Moroccan companies.

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