



Impact of the use of information and communication technologies on Business performance: Tunisian Context-Application(a) the importance in the success of ICT of companies, (b) the exploratory factor analysis and then the structural equation methods(c) Tunisian companies and (d) the companies surveyed are almost aware of the importance of the value of ICT, which implies an insufficient use of ICTs and an incomplete maturity of this field.

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Abstract

The focus of the current study is analyze the impact of the use of ICT on the performance of Tunisian companies. These companies must be always fully aware of the importance of a practical valorization of ICTs that bring about socio-economic development. Thus, using ICTs on Tunisian companies' performance has unquestionably remained a vital need. In fact, this study is carried out on a sample of 150 Tunisian companies operating in different business sectors. We chose the quantitative method. So, to test our conceptual model, we applied the exploratory factor analysis and then the structural equation methods. The empirical testing of hypotheses of this research led to partially confirm the influence of ICTs on the performance of Tunisian companies. In this regard, the companies surveyed are almost aware of the importance of the value of ICT, which implies an insufficient use of ICTs and an incomplete maturity of this field.

Indexing terms/Keywords: ICT; organizational performance; strategic performance; commercial performance; financial performance.

Type (Method/Approach): In the first phase we started with exploratory factor analysis using the software SPSS version 18.0. In the second phase of analysis, we have proceeded with factor confirmatory analyses using AMOS 20.0 to test the discriminant and the convergent reliabilities and validities of the constructs.

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Introduction

Nowadays, companies use more and more information and communication technologies (ICTs) as their main source of wealth creation which contributes in the development of productivity (Iwanon-Tournier, 2004; Monrozier et al., 2007). Indeed, the increasing spread of ICTs in the realm of business has improved and accelerated communication between employees due to a better knowledge of the environment and an effective management of human resources that help increasing the productivity of the company (Gorritz and Castel, 2010).

As a result, ICTs make it possible to memorize data and transform it into information that is exchanged among employees (Lapeyrat, 2010). Therefore, a more positive view of the role of ICTs in economic and social development is appreciated. The use of ICTs makes it easier and cheaper to access information at a time when its mastery has become a key factor for business development and where the ability to access, manipulate and disseminate information determines the feasibility and sustainability of socio-economic development (Loukou, 2012).

Several studies have emphasized the contribution of ICTs in the growth of organizations (Krovi 1993; Marakas and Hornik, 1996; Meuter et al., 2003; Paré et Sicotte, 2004; Meinert, 2005; Koivunen et al., 2008). In this sense, organizations do not hesitate to allocate significant investments in the implementation of these technologies, aiming at facing a fierce competition (Paré and Sicotte, 2004).

Nowadays, to meet the needs of a changing environment, ICTs has gained a significant importance within organizations. Because these technologies have been employed in organizations for many years, research in ICTs has widely shown that their use is very often accompanied with, and linked to, socio-economic development, which subsequently results in business performance.

Researchers, such as Reix (2003) and Maallej (2010), have shown that the more ICTs are used, the more appear effective for economic and social development, and also for business performance. This sustains the fact that the impact of these technologies on the performance is still valid.

In this study, we attempt to know how much this impact is valued in Tunisian companies. These companies must always be fully aware of the importance of a practical valorization of ICTs that bring about economic and social development. For this, we propose to analyze the effect of the use of ICTs, as an unquestionably vital need, on the performance of Tunisian companies. Our goal is, therefore, to verify the importance of this impact.

It is notably recognized that ICTs contribute to the performance of the company. However, researchers have become interested in the degree of this importance attributed by these companies. Despite the fact that the current context is characterized by an intensive use of information in many activities, the contribution of ICTs to the development of developing countries, specifically in Tunisia, has remained under scrutiny. As a result, as a topical issue, business development through the use of ICTs continues to feed discussions.

Hence, analyzing the impact of the use of ICTs on business performance has become a need because the observation of facts proves that ICTs are no longer used as mere communication devices or tools of work facilitation. Rather, they are perceived as real factors of business performance development (Gado, 2008).

On this basis, our research proposes to respond to the following:

Does the use of ICT have an impact on the performance of the company?

In other ways, is the use of ICT accompanied by economic and social development for the performance of Tunisian companies? Has it remained a simple slogan or does it reflect a reality?

In short, the objectives of this research revolve around 3 major topics:

-Investigating the impact of ICT on corporate performance (organizational performance, strategic performance, business performance and financial performance).



-Explaining a conceptual model that illustrates the relationship between the use of ICT and its effect on the performance of the company.

-Testing this model in the context of Tunisian companies.

The current study consists of four sections. The first section deals with literature review; the second one is devoted to the development of hypotheses; the focus of the third section is on research methodology and measurement of variables. Finally, the fourth section focuses on testing the hypotheses, analyzing and interpreting the results.

1. Review only

Today, everyone focuses on the computer, the internet and other technologies. The ICT sector, as a reality and a considerable factor for economic development, covers telecoms, internet, computers, and software, and consumer electronics. It is noteworthy that technology (instruments), information (data) and communication (transmission, interactivity, and collaboration) are the main three components of ICTs.

1.1. Information and Communication Technologies (ICT)

Technology: According to Gilbert (2002, p.2), technology is defined as "a gathering tools. It is a body of homogeneous knowledge (methods and know-how) made on scientific grounds".

Information: Laudon and Laudon (2000, p.8) defines information as "data represented in a meaningful and useful form for human beings." Data also constitute the sources of raw facts representing events that took place in companies or in their physical environment. Recently, information has become the most popular resource in the corporate world (Khalifa, 2016). Therefore, we must be able to find, manage, transmit, store and evidently use it as soon as possible.

Communication: Notebaert and Luangsay-Catelin (2009) find that communication within companies is an essential element that allows employees to transmit the basic information such as organizational objectives, the company's task, operational plans, quality standards, and so on.

Indeed, this type of communication has become an essential vector of shared information between employees and the company, and even among employees themselves. Communication also reinforces the corporate culture and the sense of belonging to a group (Notebaert and Luangsay-Catelin, 2009).

According to Basque (2005), ICT refers to a set of technologies based on information technology, microelectronics, telecommunications (including networks), multimedia and audiovisuals which, when combined and interconnected, allowed to search, store, process and transmit information in the form of data of various types (text, audio, fixed images, video images, etc.) and allow interactivity between people and also between people and machines.

1.2. The use and diffusion of ICTs

Since 1995, the diffusion of information and communications technology has been accelerating, which has served the efficiency of economic and social development of developing countries. In Tunisia, the development of the internet and mobile phones is a conspicuous phenomenon which is difficult to challenge.

Indeed, the evolution of these technologies in recent years has far exceeded 200% whereas technologies, known as old, such as computers and also land line telephony had a very slow evolution (Ben Youssef et al., 2004). According to these authors, ICTs are both goods and services at the origin not only of a wide dissemination of knowledge and skills, but also of capital goods allowing for the raise of financial performance of companies through increased productivity (Garicano et al., 2010).

Therefore, the use of ICTs enables increased productivity for the input of information, distribution of production, more efficient knowledge of the environment, and thus a rather high reactivity. They enhance the sharing of information within the company and the management of human resources in a much improved way (Khalifa, 2016).

ICTs have been perceived as a social necessity, an economic asset and a strategic stake (Loukou, 2012):



- An e-administration allows our governments to be more efficient and to better serve citizens through a faster flow of information in digital form,
- ICTs facilitate communication and information sharing between central and decentralized services,
- ICTs ensure the dematerialization of certain administrative procedures (teleprocedures via dedicated networks or via the Internet).

1.3. Development of employees

The emergence of ICTs is a real technological advance since they represent a source of development for staff. Indeed, the employee is the first person affected by the entry of ICTs into the corporate world. These ICTs allow interactions between individual knowledge in order to generate new collective knowledge and improve cooperative work among members of the same group or of different ones (Górriz and Castel ,2010).

ICTs have made a shift to a less centralized organization and greater autonomy of units and individuals. Computerization introduces a redistribution of information, enabling staff to have more direct access to the data they need, thereby making it more decentralized (Gollac et al., 2003).

According to Benraiss et al. (2005), ICTs improve the employees' efficiency by allowing them to have access to information; this positively affects their autonomy and efficiency. Thus, the more reliable, relevant, effective and powerful information is, the more enlightened employees become.

Indeed, previous studies (Brynjolfsson and Hitt, 2000, Greenan et al., 2001) show that ICTs can have positive effects on the development of the company's performance when accompanied with an increase in the qualification of employees and modern working methods (Ben Khalifa 2010). The company which uses ICTs must carry out specific and continuous training of its personnel in order to manage them well since lack of continuous training is often seen as one of the problems for a good use of ICT.

The integration of ICTs within the company depends, in part, on educated employees, available skills and, above all, on investments made in staff training.

Indeed, several studies indicate that employee training has a positive impact on business performance. This training allows employees to increase both their skills and adaptability, improve their productivity, and modify their behavior in order to guarantee their adherence to the company's project, which is reflected in an improvement in the performance of the company (Rabemananjara and Parsley, 2006).

1.4. Company performance

The concept of performance is at the heart of every business management process since its main objective is to get results consistent with its mission and strategic and operational planning. According Bartoli (2005), the concept of performance refers to the idea of making an action. It is vital to undertake and complete this action without being a priori explicit about the nature or the level of the result to be obtained. In ordinary language, performance precisely refers to the fact of obtaining a "good result" (Ducrou and Technique, 2008, p.39).

For businesses, the only concern was to deploy their production system and increase productivity in order to maximize their performance evaluated on the basis of financial aspect such as profit, profitability and turnover (Eccles, 1999).

For Lebas (1995), performance exists only if we can measure it, and this measure may in no case be limited to the knowledge of results. Thus, we evaluate the results achieved by comparing them with the desired results or with the standard ones.

On this basis, the measures must be "replaced by multiple non-financial indicators that are most promising targets and have better predictive value over the long-term profitability objectives of the company" (Löning et al., 2003, p. 158).

For more exploitation, the company's performance is a broad concept that includes questions on strategic, economic, business, and financial performance within the organization.



1.4.1. Organizational Performance

Bourguignon (2000, p.934) defines organizational performance as the achievement of organizational goals, regardless of the nature and variety of these objectives. This achievement can be understood in the strict sense (result, outcome) or in the broad sense of the process leading to the result (action). Bresnahan, Brynjolfsson and Hitt (2002) state that the company can improve its organizational performance when adopting organizational changes that are characterized by more flexibility in the structure and decentralization of the decision. In all cases, these changes should lead to an improvement in employee and staff relationship.

1.4.2. Strategic performance

For a company to develop, it needs an ICT strategy allowing experiencing how to face more and more difficulties in a competitive environment. The new economy places ICTs as one of the core elements of the company's overall strategy (Porter, 2001). In this context, ICTs generate a competitive advantage for firms because they become more motivated to develop innovative capacity in order to obtain more relevant results.

Companies rely on strategic performance in a variety of ways, depending on their activities and their means (Gollac et al., 2003). These strategic performances are as follows:

- Domination strategies by costs.
- Differentiation strategies: According Gollac et al. (2003), it is the production and marketing of distinctive properties, that why companies use this performance to differentiate themselves from others.
- A strategy of concentration or specialization: According to William (2008), ICT helps the company achieve its objectives according to the established strategy. They may as well be taken for a niche strategy rather than for a cost reduction strategy.

1.4.3. Commercial performance

Commercial performance implies the ability to offer the company the capacity of analysis, approximation of clients, and allows the exploitation of customer information. Thus, customers' needs are clear and the company will be a real source of competitive advantage. It also gives the possibility to create a mutual and beneficial relationship with its customers. With this type of trade relations, the company will have a very strong link with the loyal customer through offering a quality service. Moreover, the commercial performance brings together all customer information that was until then scattered in other applications, and captures new customers. Thus, commercial performance is a way for the company to become known and to approve its brand.

1.4.4. Financial performance

Financial performance refers to the financial viability of the organization, its accessibility to different sources of funding, or its profitability compared to its investments, its assets or its own funds. It mainly implies the efficiency of the production process or servitude and its ability to improve productivity by reducing costs which constitute indicators of performance (Bnaff et al., 2006). In this sense, financial performance enables the company to achieve the desired profitability, to generate a certain level of profit and hold the market share that preserves its long-term sustainability.

1.5. ICT applications to business performance

There are several types of software applications and typologies that allow better management of information and knowledge within the company. They also provide more efficient processes and improved company performance. Examples include the Internet, E-commerce and CRM which all serve reducing transaction costs.

According to Humbert-Labeaumaz (2001), e-commerce radically reduces the economic distance between producers and consumers. These can make their purchases directly without using the usual retailers, wholesalers or, in some cases, distributors. They benefit from better information, lower transaction costs and therefore lower prices, a wider choice, the possibility of obtaining products adapted to their particular needs, as well as an instant delivery for services and intangible products in digital form (Humbert-Labeaumaz, 2001).



For Ministry of Commerce and Handicrafts in Tunisia, e-commerce offers many advantages for the company, namely:

- Lowering the costs.
- Facilitating the exchange of information.
- Implementing collaborative work.
- Increasing productivity and sales.
- Developing new markets, new horizons.
- Increasing sales to foreign customers: Geographic expansion vector.
- Disintermediating and directly access markets.

The CRM offers the company a commercial performance, it has three specific objectives:

- It provides the company with analytical capacity, proximity to the customer and the ability to exploit the scope of customer information. In this way, we can truly understand customer needs and give the company a real source of competitive advantage.
- It creates and maintains a mutually beneficial relationship between a company and its customers. In this mode of commercial relations, the firm strives for customer loyalty by offering a quality of service.
- It brings together clients information which are scattered in other applications (Datamining and Datawarehouse).

1.6. Relationship between ICT and business performance

Nowadays, ICT has become a major tool for competitiveness because it plays a major role in the performance of companies. Monrozier et al.(2007) have shown that the rapid technological progress in the production of ICT goods and services can help advance capital and labor efficiency in the ICT-producing sector.

- The introduction of ICTs in enterprises

Besseyre des Horts (2008) maintain that the company must correct the form of its organization. Indeed, it is difficult to adopt technologies if the company has a typically rigid structure. Therefore, it must develop its organizational structure to a network organization characterized by greater flexibility and autonomy.

Ben Fathel (2005) points out that the use of ICTs makes the implementation of new organizational forms and business management possible and necessary. The classic pyramid structure, based on the hierarchy of positions and strict function definitions, gradually gives way to a more flexible organization favoring transversal relations, individual initiative and group work.

- ICTs and decision making

According to Kalika (2006) and Khalifa (2016), the low cost access to information and communication facilitates data processing and gives more value to the decentralization of decisions.

For Black and Lynch (2004) and Strobel (2013), companies are opting for a work management based on new practices, such as the contribution of employees to decision making or the implementation of incentive compensation policies, have a more important productivity work than companies using traditional management practices. In this sense, Bresnahan, Brynjolfsson and Hitt (2002) argue that the company can improve its performance mainly if it decentralizes decision making.

- ICT and work organization mode



Table1. Impact of ICT on companies' mode of organizing work

Old rule	New rule
<ul style="list-style-type: none"> -Information is only available in one place. -Only Experts can do a complex job. -Companies are forced to choose between centralization and decentralization. -The Managers make all the decisions. -The Field staff must have offices where they can receive, view and transmit information. -The Best contact with a potential customer is the personal contact. -You Have to know where things are. -The Plans result in a periodic review. 	<ul style="list-style-type: none"> -Information Is available simultaneously wherever it is needed. -A generalist can do the work of an expert. -Companies can simultaneously enjoy the benefits of centralization and decentralization. -Each member can make decisions at his own level. -The Field staff can send and receive information where they are. -The Best customer contact is the effective contact. - Things tell you where they are. -The Plans result in an immediate review.

Source : Hammer et champy 1993 p97-115

Table 1 clearly shows that ICTs enable enterprises to enjoy a new unstructured and somewhat formalized organizational form. However, they open new perspectives in terms of facilitating access to information and creating favorable conditions for the transparency of organizational decisions. These can improve the performance of the company.

In this sense, ICTs improve quality of work by eliminating repetitive operations and facilitating access to information needed for decision-making (Doreau, 2001). Hence, ICTs improve the efficiency and effectiveness of work in the long term.

2. Development of Hypotheses

In what follows, we will try to develop concepts that will form the basis for the development of hypotheses.

2.1. Enterprises use of ICTs

The use of ICTs by companies is closely linked to the ability of the company to adapt to changes in demand and innovation. Users of ICTs are frequently involved in the increase of the value of their investments through their own experiments and innovations, such as the introduction of processes, new types of products and applications (OECD, 2003).

On the corporate side, the use of ICTs is also essential. On the one hand, ICTs enable to limit travelling, to communicate information faster. On the other hand, it can reduce transaction costs, increase productivity, innovate, and improve product quality and services so as to satisfy and retain customers and increase their revenues (Porter, 2001; Amabile and Gadille, 2003).

On this same sphere, Turcotte and Rennison (2004) and Garicano, Luis, and Paul Heaton (2010) showed that companies using ICTs have a higher level of productivity than companies that do not use this technology. Gu and Gera (2004) also noted that the intensive use of ICTs has enabled companies to increase their productivity and chances to introduce innovations in products and processes (cited by Ben Khalifa, 2010).

The use of ICTs by companies is perceived as "the most effective and most efficient tool for them." It is considered as "an input to the company's production function" (Raymond, 2002 quoted by Missaoui, 2009, p. 9).



2.2 Business Performance

Many studies presented in the reports of the OECD (2003) highlighted the existence of a positive relationship between ICTs and business performance in terms of productivity, improvement of competitiveness, innovation, turnover growth, and the development of distinctive competencies.

Similarly, several authors (Menon et al., 2000, Devaraj and Kohli, 2003; Strobel, 2013) supported the idea of the existence of a positive relationship between ICT and business performance. Because ICTs networks are now prevalent in most of the OECD business sector, they are increasingly used to improve productivity, competitiveness and business performance. Thus, the pace of technological advances in ICTs goods and services is rapid and allows lowering prices.

For example, studies at company level indicated that the use of ICTs has a positive impact on performance and productivity of businesses, but these beneficial effects occur mainly, or only, when they are accompanied by other changes and investments (e.g. introduction of organizational changes, i.e., simple and flexible structures, new strategies) (OECD, 2007).

Other studies, such as the one conducted by Askenasy (2000), have "underlined the need to take into account the dimensions related to organizational changes for ICTs to be able to provide a positive effect on the organizational business performance" (quoted by Missaoui, 2009, p.7). Thus, the integration and use of ICTs in the company are factors that can positively influence the performance of companies and contribute to organizational changes, development of new skills, etc.

According to Reix (2002) and Raymond (2002), it is necessary to examine the impact of ICTs on performance by identifying the coherence between different dimensions such as strategic choices, structural choices and technological choices.

For Porter and Millar (1985), the impact of ICT on business performance has a multidimensional impact that provides the company with competitive advantages (Bnaff et al., 2006).

Similarly, Vidman et al.(2014) asserted that a company's performance can no longer be assessed solely on the basis of its own benefits and net results. Successful modern enterprises measure performance on the basis of the degree of achievement of strategic and operational objectives and on planned activities for the future development of the organization.

This allows us to introduce the following hypotheses:

H1: The use of ICT has a positive impact on company performance.

H1.1: The use of ICT has a positive impact on organizational performance of the company.

H1.2: The use of ICT has a positive impact on financial performance of the company.

H1.3: The use of ICT has a positive impact on strategic business performance.

H1.4: The use of ICT has a positive impact on the business performance of the company.

3. Research Methodology and measurement of variables (Materials and Methods)

Before analyzing and interpreting the results of the current paper, it is important to present the sample, the data collection tool and specify the indicators of variable measures.

3.1. The sample

The sampling phase of empirical research is an essential step to ensure that the population has been correctly identified. Thus, it is necessary to define the reference population, determine the sample size and present the procedures used for selecting the sample.



Generally, we distinguish two sampling methods, namely the probabilistic method (random) and non-probabilistic method (not random). The random or probabilistic method adopts pre-established rules extraction of individuals to question and provide a representation of the population studied. The non-random or non-probabilistic method implies building a representative sample of the population through a reasoned choice of surveyed individuals (Evard et al., 2009).

As for this study, the sample includes 150 Tunisian companies located in Sfax. We contacted these companies directly, i.e. face to face. This choice is motivated by the fact that it generally provides a high response rate and a high quality of information (Evrard et al., 2003). In addition, the face-to-face survey reduces the rate of non-responses or incomplete responses as we are present to clarify any ambiguity.

Thus, in our case, we are interested in the distribution of our sample according to the number of years of experience in the use of ICTs to find out the effect of the use of ICTs on business performance. Thus, we attempt to know the number of years the surveyed companies have used technologies and hence, we addressed companies that are most advanced in the use of ICTs.

Accordingly, the distribution of our sample according to the number of years of experience in the use of ICTs shows that most surveyed companies have used this technology for over 11 years and are surveyed between 8 to 10 years (16.7%); others are surveyed between 6 to 7 years (16.7%), and 20.7% of companies are surveyed between 3 and 5 years.

Table2. Sample distribution according to the number of years of experience in the use of ICT

Use of ICT	Number	Percentage
3 to 5 years	31	20,7%
6 to 7 years	21	14,0%
8 to 10 years	25	16,7%
More than 11 years	73	48,7%
Total	150	100,0%

3.2. Data collection

According to Evrad et al. (2009), the objective of research is to determine the choice of the method of data collection. Moreover, data collection methods generally consist of two different approaches: qualitative and quantitative approaches.

The method of analysis adopted in this research aims to detect significant relationship between the dependent variable and all the explanatory variables.

The articulated instrument of investigation in this study is the questionnaire, which is considered as a main tool of investigation that directly allows for asking specific or "closed" questions on a problem or a concern that triggers the interest of the researcher and which constitutes the object of the investigated individuals who are called to choose responses among the pre-made alternatives that are constructed by the investigator.

This form of questions has the advantage of being easy to use and does not pose a coding problem for the statistical evaluation of responses.

The questionnaire of the current paper consists of three parts:

The first part is devoted to issues related to the identification of the company.

The second one includes questions related to companies' use of ICTs.

The last part deals with questions related to companies' performance.



3.3. Operationalization of variables

The distributed questionnaire was compiled from existing measurement scales in research in management. Some scales have been reformulated to fit the measurement object.

- Use of ICT

ICT is a type of software that provides a clear-cut information management and especially of knowledge and expertise at the heart of the business. The use of ICT facilitates the process and improves the company's performance through the use of the Internet, E-commerce and CRM.

4 items are used to measure the independent variable. They are used by several works (Chwelos et al., 2001; Ben Khalifa, 2010, etc).

A 5-point Likert scale with 5 points, ranging from "not agree at all" to "strongly agree", is used to measure this variable. Respondents are asked to answer the following items:

UTTIC1: The degree of innovation of the software used in your business is high:

UTTIC2: The renewal of computer and telecommunication equipment in your business is high:

UTTIC3: The ICT investment in your business is high:

UTTIC4: The annual budget for ICT investment in your business is high:

- Performance of the company

Through literature on criteria relating to performance measurement, we found that the operationalization of this variable is fraught with problems. It is a complex construct which is measured from a set of variables.

Many researchers use financial measures based on figures concerning company profitability, market share, the genesis of profit. Others researchers use non-financial measures relating to managers' subjective perceptions (Brouthers, 2002).

In fact, using the objective measures for the evaluation of business performance constitutes a constraint relating to data collection. A second limitation arises when adopting objective measures on factors relating to volume of sales, sales growth and market share because we may have different explanations (Delbaere, 2002). Thus, it would be appropriate to consider subjective measures to come up with a more accurate evaluation of performance.

17 items, which are adopted in the work of several researchers (Soh and Markus, 1995; Bnaff et al., 2006; Ben Khalifa, 2010; Bellaaj, 2010 etc.), are used to measure the dependent variable. Thus, according to a five-point Likert scale, ranging from "always" to "never", the interviewees are asked to indicate their degree of perception on each item.

In short, we have prepared a questionnaire with 21 items that are measured by a 5 point Likert scale. Then, to ensure the clarity of the items, we have previously tested a small sample of managers in the surveyed companies. We have found no difficulty in understanding and, subsequently, no changes were made in the questionnaire.

4. Analysis , interpretation of results and Discussion

This part consists in analyzing and interpreting the results of the explanatory analyses related to the validation of the hypotheses.

The analysis of the collected data was carried out in two distinct steps. First, we assessed the dimensionality, reliability and validity of variables by exploratory and confirmatory factor analyses. Second, the methods of structural equations were applied to test the relationship between the variables of our conceptual model in connection to the use of ICT and business performance. These steps and their results will be displayed in the following subsection.



4.1. Results analysis

In the first phase of our analysis, we started with exploratory factor analysis using the software SPSS version 18.0.

It should be noted that the exploratory factor analysis (EFA) is used at this level to allow accounting for the one-dimensionality of the measurement scales for each variable, i.e. to reduce the set of observed variables to a more restricted number of factors or principal components using the PCA. According to Evrard et al. (1997, p.378), this descriptive method corresponds to an empirical approach in which factors are expressed as exact linear combinations of variables (and vice versa, i.e., variables can be expressed as exact linear combinations of factors)

Table3. Summary of the main results of the exploratory factor analysis.

Items	Quality of representation	Quality of representation				
		1	2	3	4	5
Innovation of used software	,766	,013	,885	-,025	,023	,041
Renewal of computer equipment	,719	,003	,850	,010	-,065	,138
Investment in ICT	,837	-,053	,904	-,008	,119	-,049
Annual budget of ICT investment	,798	-,008	,839	,044	-,073	-,168
Flexible hierarchy	,924	,910	-,090	-,143	,064	-,019
Autonomy of the structure	,851	,829	-,009	-,166	,021	-,105
Flexibility and knowledge sharing	,722	,870	-,019	,033	-,072	,145
Decentralization of decision	,763	,825	,060	,148	-,057	-,154
Increase in turnover	,921	,014	-,010	-,018	-,937	-,036
Productivity	,911	,010	-,032	,010	-,948	-,030
Profit	,871	,026	,035	,022	-,940	,033
Achieving the goal according to the strategies fixes	,900	,020	,018	-,925	,006	-,086
strategy of domination by costs	,823	-,021	-,004	-,933	,054	,015
distinctive skills	,762	,097	-,039	-,803	-,103	,047
Improve company image	,640	,023	,189	-,158	-,155	-,625



knowledge of customer needs	,752	,074	-,030	,209	,111	-,886
Brand awareness	,593	,165	,070	-,142	-,036	-,627
Achieving the goal of purchase or sale	,552	-,081	-,094	-,154	-,187	-,641
Eigenvalues		5.830	3.414	2.031	1.548	1.283
Cronbach alpha		0.908	0.895	0.894	0.946	0.761
KMO = 0,805 Bartlett Significance = 0,000						
cumulative percentage of explained variance = 73.361 %.						

The dimensionality of the measurement scales was assessed by a principal component analysis (PCA) with oblimin rotation. We have removed three items (perf5 "improve competitiveness" perf13 "market share" perf16 "profitability") because they are items with low factor contributions (Hair et al., 1998).

Other items have factor contributions exceeding 0.6. The reliability and internal consistency of the items constituting one dimension were assessed by Cronbach's alpha. All variables have Cronbach's alpha coefficients located between 0.7 and 0.9. We can note that all alpha values are good because they exceed 0.6 (Evrard et al., 1997, p. 294).

The 18 retained items constitute four factors recovering together 73.361% of the explained variance: The first is formed by 4 items reflecting variability of the "organizational performance". An alpha value of Cronbach ($\alpha = 0.908$) indicates a very good reliability of measurement of this factor.

The second is formed by four items reflecting "The use of ICT." The reliability of this independent variable is considered good since it is equal to 0.895.

The third factor is formed by three items reflecting "the strategic performance". The reliability test of this variable through Cronbach alpha gives a good value: (0.894).

The fourth factor is formed by three items reflecting the "financial performance", the alpha Cronbach ($\alpha = 0.946$) shows a very good measurement reliability of this factor.

The fifth factor is formed by 4 items reflecting "business performance". For this variable, and based on the threshold of this indicator (0.6) set by Nunnally (1978), the reliability test of this factor through Cronbach alpha value gives us the following value (0.761) which is considered good and greater than 0.6.

In the second phase of analysis, we have proceeded with factor confirmatory analyses using AMOS 20.0 to test the discriminant and the convergent reliabilities and validities of the constructs.

The indicator for measuring the internal consistency used in the confirmatory factor analysis that seems most suitable is the Rhô Jöreskog. It is a coefficient measurement used to check the reliability of a construct (Roussel, 2002). Thus, we calculated the rho Joreskog whose value must be greater than 0.5.

$$\text{Rhô de Jöreskog } (\xi) = \frac{(\sum \lambda_i)^2 \cdot \text{Var}(T)}{(\sum \lambda_i)^2 \cdot \text{Var}(T) + \sum \theta_{ii}}$$

With lambda λ_i : the factor contribution of item i; **Var(T)** variance of the latent construct and **θ_{ii}** the error variance of item i.



With respect to the convergent validity in this research, we refer to the approach of Fornel and Larker (1981) which is based on the calculation of the Extracted Average Variance and requires that it is greater than 0.5.

As for the discriminant validity, we also refer to the approach of Fornell and Larcker (1981) which consists of checking if the structural link (squared) between two constructs is lower than the extracted average variance (VME) of each construct. Table 4 presents the results of the convergent and discriminant reliabilities and validities.

Table 4. Results of the analysis of convergent and discriminant reliability and validity.

	Rh� of J�reskog	Rh� of Convergent validity (VME)	Discriminant Validity
Use ICT	0.850	0.795	$0.795 > \delta^2_{utiltic-perforg} = 0.047$ $0,795 > \delta^2_{utiltic-perffin} = 0.003$ $0.795 > \delta^2_{utiltic-perfstra} = 0.004$ $0.795 > \delta^2_{utiltic-perfcom} = 0.053$
Organizational Performance	0.874	0.751	$0,751 > \delta^2_{perforg-perfefin} = 0.103$ $0.751 > \delta^2_{perforg-perfstrat} = 0.161$ $0.751 > \delta^2_{perforg-perfcomm} = 0.225$
Financial Performance	0.946	0.896	$0.896 > \delta^2_{perforfin-perfstrat} = 0.164$ $0.896 > \delta^2_{performfin-perfcomm} = 0.285$
Strategic Performance	0.896	0.846	$0.846 > \delta^2_{perfostr-perfcomm} = 0.195$
Commercial performance	0.691	0.530	-

From Table 4 above, it is clear that all the Rh  coefficient values of J reskog are greater than 0.6. They vary between 0.691 and 0.946, which allows commenting on the reliability of these constructs.

We can also conclude that convergent validity is checked since all VME coefficients are above 0.5. In addition, the discriminant validity is checked since all structural links are below the convergent validity (VME).

4.2. Interpretation of results

In this phase, methods of structural equations were applied to test our research hypotheses. The application of structural equation methods helped to confirm or refute the research hypotheses. But, prior to the interpretation of explanatory relations between the different latent variables, it is necessary to ensure the quality of the adjustment of the structural model.



Table 5. The structural model adjustment indices.

Adjustment indices	Chi2/dl	GFI	CFI	TLI	RMSEA	PNFI
Thresholds of acceptability	between 2 and 5 (good) < 2 excellent	>0,9	>0,9	>0,9	<0,08 threshold limit 0, 1	> 0,5 The strongest possible
Actual values	2,290	0,829	0,913	0,900	0,093	0,728

The results of this Table and the model fit indices were satisfactory. Indeed, the value of GFI (0.829), being close to the critical level of 0.90, can be explained by the sensitivity of the index to the number of parameters to be estimated (Hair et al., 1998; Roussel et al., 2002). Hence, it can be considered satisfactory in so far as its value is very close to the recommended threshold of 0.9 (Hair et al., 1998).

The RMSEA (, 093) is below the threshold limit of 0.1. Incremental index (TLI = ,900 ; CFI = , 913) are all acceptable. These indices show a good fit of the tested model. The good fit of the model is also confirmed by the parsimony indices. The first clue χ^2 / df (2,290) satisfies the threshold advocated of 2 to 5 and the PNFI (, 728) is satisfactory.

A good fit is essential but not a sufficient condition for the validation of the hypotheses of the model (Roussel et al., 2002). Therefore, a hypothesis is accepted when the value of the corresponding Critical Ratio (CR) is greater than 1.96 in absolute value. In Table 6 below, we present the results obtained with the use of Amos 19.0 software.

Table 6. Results of the structural model.

			Estimate	S.E.	C.R.	P
PERFORG	<---	UTILTIC	,278	,110	2,521	,012
PERFFIN	<---	UTILTIC	-,083	,104	-,794	,427
PERFSTR	<---	UTILTIC	,091	,119	,767	,443
PERFCOM	<---	UTILTIC	,256	,111	2,297	,022

- The impact of ICTs on organizational performance (H1.1)

Technological progress is a source of organizational performance (flexibility of hierarchical procedures, autonomy in terms of structure, flexibility and knowledge sharing, decentralization of decisions). Hypothesis (H1.1) relates to the relationship between ICT use and organizational performance. The results of this Table show that the use of ICT has a significant impact on organizational performance of the company. As indicated, the 0,012 threshold that is less than 0.05 and CR is in the range of 2.521 > 1.96. This allows us to accept hypothesis H1.1.

- The impact of ICTs on financial performance (H1.2)

The financial performance is a construct that can be measured objectively. In this study, the objective measurements of performance are used through items relating to profit, turnover and productivity.



The results in Table 6 indicate that the use of ICT has no significant and positive impact on financial performance because ($CR = |-0.794| < 1.96$ and $p = 0.427 > 0.05$). Thus, hypothesis (H1.2) is rejected.

- The impact of ICTs on strategic performance (H1.3)

In this hypothesis, the strategic performance is measured by three items: achieving the goal set by the strategies, adopting a strategy of cost leadership and developing distinctive competencies. On the basis of the results of the statistical analyses indicated in Table 6, the use of ICT does not have a significant and positive impact on strategic business performance since the risk of rejection of the null hypothesis is significantly greater than 0, 05 (it is 0.443) and CR is in the range of $0.767 < 1.96$. This leads us to reject hypothesis H1.3.

- The effect of the use of ICT on business performance (H1.4)

Performance is a construct that can be measured subjectively since improving the image of the company, increasing brand awareness, achieving the objective of buying or selling are all relating to the commercial performance.

Then, hypothesis (H1.4) predicts the existence of a relationship between the dependent variable (the commercial performance) and the independent variable (the use of ICT). The results show that the causal links between these two variables showed a significant and positive relationship ($CR = 2.297 > 1.96$ and $p = 0.022 < 0.005$). Thus, hypothesis (H1.4) is accepted.

Thus, the obtained results show that the use of ICTs has an effect only on organizational performance and business performance. The use of ICT has no influence on the strategic and economic performance. Therefore, H1-1 and H1-4 hypotheses are accepted while H1-2 and H1-3 hypotheses are rejected. The following figure is illustrative:

4.3. Discussion

The objective of this section is to analyze in depth the results of the empirical study to identify the impact of company use of ICTs on its performance. We try, as well, to approximate the results obtained in our study with those found in other previous studies.

Our results show that the surveyed firms are almost aware of the importance of the enhancement of ICT, which shows insufficiency in terms of business use of ICTs. This, in turn, indicates their incomplete maturity of this field.

In this regard, the empirical verification of our research hypotheses enabled us to partially confirm the influence of ICT use on the company's performance. In this sense, we noted that Tunisian companies partially consider the use of ICTs as an important determinant of their performance.

- The organizational performance

The obtained results indicated that the use of ICT by the company affects its organizational performance. This relationship is confirmed in the studies that have shown the positive link between the use of ICT and companies' organizational performance. In this sphere, Soh and Markus (1995) emphasized the fact that company use of ICT has a positive effect on its organizational performance.

This view is consistent with the one found in the theory of Bresnahan, Brynjolfsson and Hitt (2002). They assume that the company can improve its performance if it decentralizes decision making. This is explained by Tunisian companies' awareness of the importance of using ICTs for a better organizational performance.

They are convinced that ICTs bring new modes of organization that are often characterized by flexibility. In addition, according to employees in Tunisian companies, organizational performance is essential because it is the first step that helps confirm other performances.

Besides, performance facilitates information sharing between employees, which allows for making decisions. In addition, it values the work of employees since ICT is interested in employee satisfaction and improves the climate in the workplace. Employing ICT means learning to work for individual and collective work with colleagues, and taking advantage of the functionality offered by these tools. According to Tunisian employees, the key to success lies not in the sophistication of tools, but in the setting up of a collaborative business climate and the involvement of staff in the use of ICT, which brings social development.



Financial Performance

According to Rival (2006), the objective approach refers mainly to the directly observable data (i.e. sales, profitability, etc). Myers (1995) showed that the use of information technology and communication provides significant financial gains and positively affects financial performance. This result is different from the findings of Turcotte and Rennison (2004). These authors have shown a significant association between the use of ICTs and business productivity.

Also, the results of our study are not consistent with several researchers' findings. For instance, Gu and Gera (2004) maintained that the intensive use of ICTs has enabled companies to increase their productivity and their chance to introduce product and process innovations (Ben Khalifa, 2010; Strobel, 2013).

However, our research has shown that the company's use of ICT does not have a positive impact on financial performance. Indeed, this hypothesis has not been verified in the Tunisian context. This is due to the issue of investment. That is to say, according to the Tunisian personnel, the use of ICTs depletes the budget and also there will be no increase in profits because they pay a lot on the renewal of hardware, software etc. This is added to the fact that because competition is intense, there is no increase in turnover.

Unfortunately, we can add that some employees use technologies including the internet, e-mail, etc. for exclusively personal purposes like facebook and skype that are not part of the work of the company. This abuse of use results in a risk of loss of productivity and slows down the company's performance. In this case, the use of ICTs does not bring economic development.

- Strategic Performance

Parsons (1983) assume that the use of ICTs can contribute to the success of generic strategies of cost minimization and/or differentiation. Reix (2002) and Raymond (2002) emphasize the need to consider the impact of ICTs on business performance through strategic choices.

From the obtained results, the use of ICTs does not have a positive impact on the strategic performance of the company. This result can be explained by the fact that Tunisian firms have not been interested in the use of ICTs in their strategies.

In this sense, the use of ICTs in the Tunisian context allows us neither to achieve the goal set by the strategy nor to adopt a strategy of domination by costs. In addition, customers want different, new and special products with the least cost, which is unreasonable and not fine-tuned with the strategy of companies.

- Business performance

Bnaff et al. (2006) assume that the use of ICTs by the company positively affects business performance (improved bargaining power, expanding the range of products, better meeting customers' needs, and brand awareness). From the obtained results, the use of ICTs has a positive impact on business performance.

Our research has shown the significance of this relationship because the use of ICTs helps improve the company's image, increase its understanding of customers' needs, increase its brand awareness, and achieve its objectives. In conclusion, the customer is the center of gravity of the commercial performance since he/she is the one who improves profitability.

Through literature review, we found that there is a link between the use of ICTs and business performance. Thus, ICT plays an important role in company's growth, development and performance. That is, the use of ICT allows for an increase in labor productivity, better knowledge of the environment, and greater responsiveness to this environment. It also improves the image of the corporate brand by offering a better quality of service.

Conclusions

ICT is used to provide access to knowledge, information and communications that are often portrayed as a lever for business performance. ICTs participate in the development of employees who subsequently improve business development. In this sense, the use of ICTs by the company has known a true development of its staff over the last few years. These ICTs introduce a new way of working that promotes new forms of work organization (Tele-coordination, virtual organization, etc.) affecting the coordination of work. They provide the staff with greater autonomy, a better organization of work, i.e., a better comfort and a better efficiency. This way, staff can quickly have access to information and can communicate their own information quickly (Demagnet, 2010). Thus, the human factor is the essential element in the success of the integration of ICTs in the company.

Employees must constantly be aware of the latest developments in technological tools through adopting intranet, workflow, groupware, etc., to promote exchanges between staff and the social link between employees of the same entity (Lapeyrat, 2010).

In this paper, we have attempted to detect the extent to which companies that are using ICTs can improve their performance. Our study also highlighted the particular importance of ICTs in economic and social



development, namely their ability to increase the efficiency of economic and social processes, cooperation among different stakeholders and increase the volume and range of information accessible to employees and businesses.

Through literature review, we found that there is a link between the use of ICTs and business performance. ICT plays an important role in the economic and social development which subsequently leads to a company's performance. ICTs increase productivity, widen knowledge of the environment and respond strongly to this environment; they also contribute in the improvement of the company's brand image.

At the theoretical level, we propose a clarification of the term "Information and Communication Technology" and "business performance". On the basis of this approach, a conceptual model could be constructed in order to highlight the theoretical determinants from the literature. For Bnaff et al. (2006), performance is a broad construct that encompasses questions about organizational, strategic, business and financial performance within the organization.

Performance is a broad construct which includes questions on strategic, organizational, commercial and financial performance within the organization. To highlight hypothetical causal relations between latent variables of the conceptual model, we used the methods of structural equation. Using these methods, known as second generation, through empirical research on the use of ICT and business performance is quite cost effective compared to methods known as first generation (ANOVA, regression, etc.).

The empirical testing of our research hypotheses has led us to partially confirm the influence of ICT use on company's performance. In this regard, we noted that Tunisian companies partially consider the use of ICT as an important determinant of their performance.

Indeed, we empirically tried to identify and understand the factors stimulating Tunisian companies to prefer one mode to another and to dedicate more ICTs that could improve their performance. In this sense, companies in Tunisia are required to take into account the crucial role of ICTs to improve their functioning and development.

However, our study has a number of limitations that can be overcome in future research and that may also display new research perspectives.

First, our research focuses on addressing Tunisian companies in different industries; that is to say, the focus was not on one or two areas of specific activities. Certainly, the fact of conducting a study in various industries may allow controlling certain specific contingencies related mainly to company performance; but, it limits the scope of the obtained results, their specificity to a context, and therefore limits the research validity.

Second, although our questionnaire is submitted to managers and personnel responsible for all activities related to technology, we have been forced to accept the answers of other managers and directors.

In addition, the non verification of certain hypotheses leads us to think that it might be relevant to feed the model with other variables, i.e., a larger number of variables could influence the use of ICT on company performance. Also, other factors, such as intermediaries in the business environment, are also interesting to examine.

Ultimately, the cleared limitations of this work have allowed us to suggest some avenues for future research. The possibility of mobilizing other models and theoretical approaches would be able to better trace the horizons of ICT use. So, it would be interesting to deepen this work by applying it to other companies in the same industry located in other regions of Tunisia.

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