The Impact of Information Systems on user Performance: An Exploratory Study

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Information systems play an important supportive role in most sectors of the economy. This study was developed to answer the question related to the impact of information systems on user performance in Tunisian companies. This article proposes a model combining the Task Technology Fit (TTF), the Technology Acceptance Model (TAM) and Delone & McLean model to evaluate the performance of users in the Tunisian organizations. The model was tested using survey data collected from 314 users of the information system. The results of structural equation analyzes supported the proposed model and highlighted the important role of perceived ease of use and perceived usefulness in mediating effects between TTF, system quality and information quality and performance users.
The results show that TTF, system quality and information quality directly influences the performance of users and indirectly through perceived usefulness and perceived ease of use.

Keywords: *Information System, System quality, Information quality, User performance.*

Introduction

Understanding the impact of information systems on the performance of users is very crucial for all organizations because it can improve performance either organizational or individual. However, the value of understanding the impact of information systems on user performance has not yet received adequate attention. Most previous researches have focused on identifying the determinants of computer acceptance, making it inadequate to determine the

impact of different types of information systems user performance[24- 25- 35- 34- 40].

Then, with increasing competitive pressures, managers are trying to achieve maximum productivity of people, processes and information systems. This leads one to ask, how can managers configure information systems to achieve higher levels of performance end users? In this regard, managers continually seek advice on how to meet the promises and expectations of continued increases in productivity through the use of information. However, the results of research on how to achieve better performance through the use of technology and information systems in organizations, has been mixed. Therefore, it has been difficult for researchers in information systems to provide managers with advice on investmenting in specific aspects of information systems that lead to the highest performance possible users [43].

In light of these facts and because organizations invest significant resources in the adoption of IS, this research attempts to assess the impact of IS systems on the performance perceived by the user in the Tunisian organizations. In other words, in conducting this study, we must answer the following question: What is the impact of IS on the performance perceived by the user in the Tunisian organizations?

The rest of the paper is structured as follows. In the next section, a theoretical framework will be developed. Followed by the framework, a research model and hypotheses to be constructedin Section 3. Sections 4 and 5 describe the research methodology, the data analysis procedure and the results of the tested model. Finally, in sections 6 and 7, the results of this research will be discussed as well as the theoretical and managerial limitations and future directions of research, followed by conclusions.

Literature Review

The impact of information systems on the performance of end users and the relationship between information systems and performance and productivity is of great interest to many researchers and research showed SI [38]. A large number of researches have been associated with the performance of end-user starting with Davis [19] with the model technology acceptance (TAM).

Thus, DeLone and McLean [21] identified six factors for the success of information systems, namely system quality, information quality, system use,

user satisfaction, individual impact and organizational impact. In addition, Seddon [59] in his extension of the work of DeLone and McLean, resumed their factors and added others. Of course, researchers are a major challenge to find a conceptual and theoretical framework for interpreting the effects of information systems on user performance and productivity.

Despite huge investments in information systems in recent years demonstrate the effects of information systems performance has proved extremely difficult [54- 49- 8- 3].

This relationship is multifaceted and includes several aspects such as the user's work, tasks and other aspects that will be discussed in what follows.

Igbaria and Tan [40] studied the relationship between information systems and users by investigating performance on several factors, including the use of the system, system quality, information quality and performance of the user. Data were collected from users in large organizations. They concluded that the above factors positively affect user performance, with results that suggest that user satisfaction is an important factor which affects the use of the system.

Similarly, Chan and al. [14] examined a number of important factors that affect the performance of users in incorporating many factors from different perspectives to determine their contribution to the improvement of user performance. In their model, the main factors considered are the data models, task characteristics and user characteristics. They concluded that these factors positively affect user performance. They also mentioned that other factors may have an impact on user performance than the rest. For example, the accuracy of the information was the most effective dimension of the quality of information affects the performance of users, as the users are concerned about the quality of information they get from a system which in turn affects the quality of their performance.

Recently, the impacts of information systems on individual performance were considered by Stone et al. [64] in their study. They presented a theoretical model linking information quality, system quality and the tasks performed on organizational performance with the ease of use of the system and the impact on individual performance. The results show that the measures of the quality of information and system quality affect the tasks performed by the user.

Some researchers have adopted a close and profound attention to investigate the effects of a specific system performance of the user, and to

examine in detail the impact of the quality of the performance of the user. For example, Butler [13] stated that the response time of the system is very critical for the performance user; the results show that the response time of the system positively affects user performance and other factors on the quality of system such as accuracy and reliability.

Researchers have attempted to control these factors more deeply to identify their impact on user performance more accurately. For example, Wierschem and Brodnax [69] identified the impact of improvements in the treatment of personal computers processors speeds on user productivity.

A controlled laboratory experiment was conducted to measure the impact of the speed of the processor on the output of the students. Based on the results of the experiment, it was found that the productivity of the end user, as measured by an increase in the volume of work is improved.

These studies have established very important conclusions on certain factors and their interactions that affect the performance of the user, such as the use of the system, system quality and reliability. In addition, they have improved the previous models and have developed more comprehensive models and conducted new empirical investigations on the impact of information systems on user performance.

Some previous research on the performance of users relied on dispositional factors such as attitudes and intention to use, to examine the impact of information systems and predict user performance [41], which leads to more conclusive debate and ambiguity. However, Sears and Jacko [58] studied the effects of situational factors on the performance of the user. They have established close links between the system, the task, satisfaction and performance. In the same vein, Hossain et al. [37] relied on the psychological traits of users in order to study the impact of information systems for clients on user performance. The results show the significant impact of traits on the relationship between information systems and performance users.

Researchmodel and hypotheses

The proposed model was developed after a review of the results of studies on information systems, covering the most important factors in both information systems and user performance. Thus, this research is carried out in companies with one or more information systems, users are invited to assess the actual impact of information systems on user performance. This choice is

supported by previous research [7-27- 21- 18].

Models TAM, TTF and D & M complement each other, which mean that their integration is useful for understanding the impact of information systems [23]. Previous research has studied these models separately without links between them. However, theoretical and empirical reasons argue for the existence of links between these models [65]. Therefore, the research model proposed by extending TAM and TTF model with D & M provides a better explanation of the impact of information systems on user performance (Figure 1).

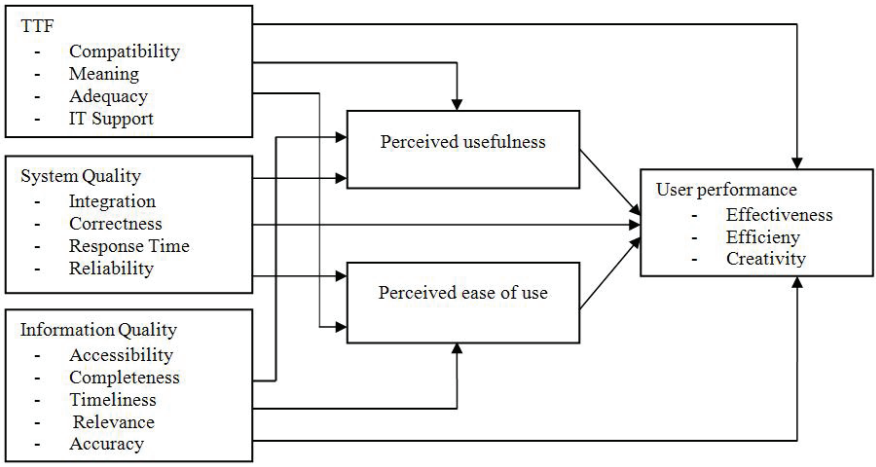

Figure 1: Operational research model

Task Technology Fit (TTF):

The Task Technology FIT (TTF) is one of the well-known models in IS used to study the relationship between a system, the task requirements and user needs. This model is based on the idea that when the characteristics of user tasks and characteristics of the information system integrate well together, both system use and user performance will be high [27]. Relationships between factors associated with TTF such as compatibility information (Compatibility), understanding the information (Meaning) and the ease of information retrieval (locatability) reflect the consistency between the needs of users, or what is called the task requirements and the technology used to perform these tasks. Thus, the consistency of the characteristics of the system with the user requirements leads to better performance [27].

Empirically, the results show that TTF factors directly affect the performance [42]. In other words, the capacity of the system can affect the perceived usefulness in improving user interaction with the system. In this sense the system's ease of use, perceived usefulness and perceived ease of use are linked together [60]. For example, a high quality system provides faster response to users, leading to improvements in the perceived usefulness and performance [46].

Finally, it is worth mentioning that the level of the relationship between all the factors mentioned above differs from SI environment to another, depending on the characteristics of the system and the user. However, in developing the study design, the factors were chosen deliberately systems. Overall, the factors were chosen with reference to a wide range of studies and their use in information systems and user performance. From this we posit that:

H1: The TTF affects user performance directly and indirectly through perceived usefulness and ease of use in organizations.

H1a: The TTF directly affects user performance in organizations.

H1b: The TTF indirectly affects user performance in organizations through perceived usefulness.

H1c: The TTF indirectly affects user performance in organizations through the perceived ease of use.

Information Quality:

The literature on information quality reflects the existence of a number of views on what constitutes the attributes of information. A large number of empirical studies have been conducted to develop a framework for measuring the quality of information [67- 39], from the many characteristics identified by Bailey and Pearson (1983) such as accuracy, precision, currency, timeliness, completeness, conciseness, format and relevance. Confirming the previous frame, Watson and Shneider [68] identified five characteristics of information quality are accuracy, timeliness, conciseness, convenience and relevance. In this sense, Huang and Wang [39] have conducted a series of studies on information quality and have used the accuracy, relevance and accessibility.
Miller [51] used usefulness, accuracy, timeliness and relevancy to measure the information quality, while Alka [1] used the clarity, relevance, accuracy and timeliness of research users. Similarly, Bovee (2004), used the relevance, interpretability, accuracy and accessibility.

In conclusion, by analyzing these measures, it seems possible to formulate a basic measure for this study. The characteristics of quality information most commonly and widely accepted are identified and presented in Livari (2005), Bovee, (2004), DeLone and McLean (1992, 2003) and Wang and Strong (1996). This study therefore reinforces these features commonly used to construct a measure of the quality of information that includes the relevance, accuracy, timeliness, completeness and accessibility. From this logic, and parallel with past studies, we hypothesize:

The quality of information affects the performance of users directly and indirectly through perceived usefulness and perceived ease of use in organizations.

The quality of information directly affects the performance of users in organizations.

The quality of information indirectly affects user performance in organizations through perceived usefulness.

The quality of information indirectly affects user performance in organizations through the perceived ease of use.

System Quality:

The measurement of the quality of information systems is a multidimensional process focusing on different aspects, because a system has many aspects such as system aspects, quality aspects and other aspects related to technical issues. In general, the measure of system quality concentrates on the specifications of a target system. However, some studies have examined the benefits and use of the system and its efficiency. Some studies have used the reliability, response time and ease of use as mentioned in various researches to support ERP users to perform several tasks at the same time and for different purposes [2].

Typical measures of the system quality in the traditional studies include system stability, availability, response time and ease of use [71]. In this context, it should be noted that researchers used different measures to investigate the system quality depending on the nature of the research and its objectives. Some studies have focused on the technical aspects of the system, while others focus on system performance and its ability to provide quality information. However, most studies have many similar measures. According to DeLone and McLean [22] quality system is measured by the perceived ease of use, reliability, functionality, flexibility, data quality, integration and

portability, reflecting the users needs dependence on system quality. However, from a practical point of view, a high level of system quality can provide users convenience, more privacy and quicker responses. For example, Lederer et al. [46- 47] have shown that the capacity of the system have had a positive impact of perceived ease of use and perceived usefulness of the system.

Indeed, many researchers have generally focused on the performance characteristics of a system to measure the system quality. These features were mostly drawn from the list of Hamilton and Chervany (1981) concerning measures of the quality system. The list is probably the best known in the literature in terms of the measure of the system quality [33- 73- 74].

The list includes response time or so-called the turnaround time, reliability, flexibility and ease of use. The researchers found that the list covers all relevant elements of the quality system. Seddon [59] measure the system quality by reliability, user interface, consistency, ease of use and quality, which is consistent with the list of Hamilton and Chervany [33]. Thus, in this research the system quality measures are reliability, response time, correctness and integration. Based on the theoretic and empirical support, we hypothesize that:

H3: The system quality affects user performance directly and indirectly through perceived usefulness and perceived ease of use in organizations.

H3a: The system quality directly affects the user performance in organizations.

H3b: The system quality indirectly affects user performance in organizations through perceived usefulness.

H3c: The system quality indirectly affects user performance in organizations through the perceived ease of use.

Ease of use and perceived usefulness:

The perceived ease of use refers to the extent to which users believe that using a particular system would be easy to manage, manipulate and regroup [44- 19- 67]. The perceived ease of use shows the degree to which a system is considered as not being too difficult to understand, learn and use. The perceived ease of use was found to influence the behavior of users, either directly or indirectly, by the use of the system.

On the other hand, Perceived usefulness refers to whether the system provides accurate, timely, relevant, reliable and valid information for users or not [51]. Therefore, using the system will enhance job performance,

productivity, efficiency and quality of work.

As noted by Bhattacherjee [11], the willingness of a person to interact with a particular system is already considered useful. Thus, it is expected that users will adopt a system if they believe that it will help them to achieve the desired results of performance [4].

In the literature, the perceived ease of use and perceived usefulness are interdependent and used together in most aspects of research that affect each other in individual aspects [19]. Perceived usefulness is regarded as a term for the individual impacts such as improving individual productivity and performance [55- 59]. In addition, Wixom and Watson [70] found that the quality of information, system quality and perceived usefulness are related to each other, expressing that the higher is the level of quality of information and quality system, the higher the system is useful.

Measures for the perceived usefulness and perceived ease of use were adapted from previous studies using the model of technology acceptance [19- 40- 52- 60- 66].Therefore, we posit that:

H4: The information qualities affect perceived usefulness and perceived ease of use of IS.

H4a: The information qualities affect the perceived usefulness of IS.

H4b: The information qualities affect the perceived ease of use of IS.

H5: The system qualities affect the perceived usefulness and perceived ease of use of SI.

H5a: The system qualities affect the perceived usefulness of IS.

H5b: The system qualities affect the perceived ease of use of IS.

User performance:

There are different points of view on user performance. It can simply be considered as the set of results achieved. On the individual level, it is the set of a person's realizations [61- 6- 9].

Measuring performance is normally achieved by aspects such as speed, time, accuracy, efficiency and effectiveness [26]. Nevertheless, when it comes to work-based software, it is important that systems are able to provide people with information so they can work and make decisions [62]. This success is measured in terms of speed and accuracy of obtaining the necessary information to users from a system to accomplish their [26].

Some researchers have indicated that the performance can be evaluated using two performance measures namely productivity and quality

of work. According to Hodgkinson [36], performance is usually measured by quantitative and qualitative indicators, which generally fall into three main indicators of effectiveness, efficiency and quality in order to describe the relationship between the input and output of resources, thus, referring to the effectiveness and efficiency. Though, there is another indicator of performance measurement which is the ability of people to create new ideas related to their work or how they carry out the work.

Based on the work of Cohen [17], performance can be measured through three criteria which are the quantity of outputs, quality of outputs and behavioral outcomes. Cohen also included efficiency measures of productivity, quality time response. In short, objective measures of performance are not available and in any case, would not have been compatible with all individuals having different jobs and tasks [27]. Therefore, for the purposes of this research, the performance of users will be measured by the effectiveness, efficiency and creativity by asking users their views about their perceived performance, because Most of the measures used in previous studies refer to these three measures.

Research Methodology

Empirical validation of the research model of the impact of IS on the performance of the users was conducted using a questionnaire administered to 400 users of IS in Tunisian companies. Of the 400 completed questionnaires, 86 were rejected because of outliers. The final sample size was thus established in 314 participants of whom 200 are women and 114 men. The age of respondents varied between 26 and 60 years with a concentration in class 30 to 39 years. The age of respondents varied between 2 and 25 years with a dominance in the class 4 to 6 years. The questionnaire distributed was formed from the scales we adapted.

Measurement scales were developed following the procedure of Churchill [16]. In the exploratory phase, we proceeded to the generation of a set of items based on adaptation of existing scales (Appendice 1).

The collected data were analyzed in two stages. Firstly, the exploratory and confirmatory factor analysis was conducted to assess the dimensionality, reliability and construct validity. Secondly, the methods in Amos structural equation 18 were used to test the relationships between variables in the model of ERP and performance users. These two steps and their results will be presented in what follows.

Analysis of results

Factorial analysis:

The exploratory analysis was conducted in SPSS 17. The dimensionality of the scales was assessed by a principal component analysis (PCA) with varimax rotation. Four items were eliminated Complet2, Resptime2, Effectiv5 and Efficien1. These are items whose contributions are shared between several axes or those with low contributions factor [32]. Measurement instruments have good psychometric qualities. All items selected are generally good factorial contributions. Reliability and internal consistency of the items constituting a single dimension were evaluated based on Cronbach's alpha. All variables in the model have good Cronbach's alpha coefficients. Appendice 2 provides a tabulated summary of the main results of the exploratory analysis.

In a second phase, a confirmatory factorial analysis was performed in 18 Amos to test construct convergent and discriminant validities. At the conclusion of this step, the analysis of construct validity yield acceptable results. Table 1 summarizes the adjustment indices that can be considered good, given the complexity of the model and the size of the relatively small sample [56]. The first index (Chi-2/ddl) satisfies the threshold advocated 2 to 5. The RMSEA is less than the threshold limit of 0.08. CFI and TLI are above the critical threshold of 0.9. The GFI and AGFI are satisfactory insofar as their values are close to the recommended threshold of 0.9. These values may be due to the sensitivity of these indicators to the number of parameters to estimate and the sample size [32- 56]. The adjustment of the measurement model is therefore considered satisfactory (GFI = 0.887, AGFI = 0.841, CFI = 0.938, TLI = 0.925, RMSEA = 0.049 and RMR = 0.045).

Presentation of the causal model and verification of assumptions regarding causal links:

The causal model of our research provides a good adjustment. Indeed, absolute, incremental and parsimony indices shown in Table 1 satisfy the empirical conditions generally recommended in previous research.

Table 1: Adjustment of the causal model

Indice	Chi-deux/ddl	GFI	AGFI	RMR	RMSEA	TLI	CFI
Value	1,479	0,916	0,893	0,075	0,52	0,932	0,940

Figure 2 shows the causal model that integrates system quality, information quality, perceived usefulness, and perceived ease of use and user performance. This model explains the impact of information systems on the performance of users and provides information about intensity and significance of the relationships between variables.

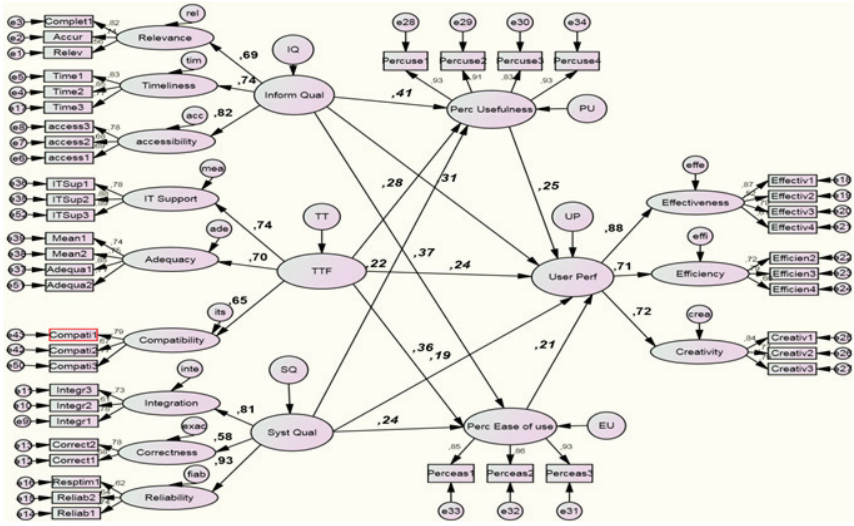

Figure 2: The causal model

At this level, the causality of this model allows the validation of all the assumptions of our research work. Indeed, Table (2) shows that all causal links are significant at the 5% level.

Table 2: Significance of the causal links of the causal model

Causality		Student Test	P	Esti-mate	Hypothesis
H1a	TTF ⟶ User perfor-mance	2,993	0,003*	0,236	Accepted
H2a	Information Quality ⟶ User performance	3,465	0,000*	0,307	Accepted
H3a	System Quality ⟶ User performance	2,781	0,005*	0,190	Accepted
H4a	Information Quality ⟶ Perceived usefulness	5,113	0,000*	0,407	Accepted

H4b	Information Quality ⟶ Perceived ease of use	4,800	0,000*	0,369	Accepted
H5a	System Quality ⟶ Perceived usefulness	3,529	0,000*	0,221	Accepted
H5b	System Quality⟶Perceived ease of use	3,741	0,000*	0,238	Accepted
* : P < 0,05 (Significant).					

The importance of the mediating effect at the causal model:

After testing the significance of direct causality between the relational variables of our causal model, it is relevant to present in this paragraph the indirect links and show the importance of mediating variables in our model.

Table (3) to determine the importance of indirect effects compared to direct effects and total effects. In addition, a more detailed complement of this table was done at the level of testing mediating variables in order to check the significance of indirect effects and total effects.

Table 3: Direct, indirect, and total effects at the level of causal model

Structural links	Direct effects	Indirect effects	Total effects
TTF ⟶ User performance	0,236	0,144	0,380
TTF ⟶ Perceived usefulness	0,277	0,000	0,277
TTF ⟶ Perceived ease of use	0,357	0,000	0,357
System Quality ⟶ User performance	0,190	0,105	0,295
System Quality ⟶ Perceived usefulness	0,221	0,000	0,221
System Quality ⟶ Perceived ease of use	0,238	0,000	0,238
Information Quality ⟶ User performance	0,307	0,179	0,486
Information Quality ⟶ Perceived usefulness	0,407	0,000	0,407
Information Quality ⟶ Perceived ease of use	0,369	0,000	0,369
Perceived usefulness ⟶ User performance	0,246	0,000	0,246

Perceived ease of use → User performance	0,213	0,000	0,213
* : P < 0,05 (Significant).			

It remains to verify the significance of these indirect effects, thing that AMOS software does not carry out, hence the use of the Sobel test. Sobel test is used to verify the presence of a mediation effect; it can determine whether the indirect effect of the independent variable divided by the dependent variable through the mediator is significantly different from zero [56].

Table 4: Sobel test for indirect links of the causal model

		TTF/User Performance			
		Indirect effect	Z-Score	P	Hypothesis
H1b	Mediating Variable : perceived usefulness	0,0875	2,7233	0,0065*	Accepted
H1c	Mediating Variable : Perceived ease of use	0,0970	2,5340	0,0113*	Accepted
		Information Quality/ User Performance			
		Indirect effect	Z-Score	P	Hypothesis
H2b	Mediating Variable : perceived usefulness	0,1667	2,9402	0,0033*	Accepted
H2c	Mediating Variable : Perceived ease of use	0,1304	2,5011	0,0124*	Accepted
		System Quality/ User performance			
		Indirect effect	Z-Score	P	Hypothesis
H3b	Mediating Variable : perceived usefulness	0,0646	2,5172	0,0118*	Accepted
H3c	Mediating Variable : Perceived ease of use	0,0602	2,3000	0,0214*	Accepted
* P < 0,05 (Significant)					

The indirect effect of the FTT, system quality and information quality divided by the performance of users through perceived usefulness and perceived

ease of use is positive and significant. This result shows the mediating role of perceived usefulness and perceived ease of use.

Discussion of results

TTF and performance users:

The results indicated that the TTF affect significantly and positively user performance. Goodhue and Thompson [27] suggested that the FTT had a significant and positive effect on the performance of the user. Consistent with previous research on this relationship [63- 15, this study also confirmed this relationship in two different ways, including the direct effect of the FTT on user performance and the indirect effect through the perceived ease of use and perceived usefulness. The results of this study confirm what was proposed in the original model and in previous studies in terms of impacts TTF. Therefore, the TTF is an important factor in the current research model, as in the original model.

Goodhue et al. [28] found that when a system has the features needed to accomplish a task, better performance is achieved. In addition, if a system is designed, which will lead to more users, which should produce a greater impact on user performance [63]. In addition, the study confirmed that TTF is also a robust model in which the task characteristics and technology determine the correspondence between the functional requirements of IS, and task demands [72].

Other factors such as perceived ease of use and perceived usefulness also contribute to the relationship between TTF and performance of the user. In addition, the study revealed that TTF affects user performance more significantly thanks to the perceived ease of use than perceived usefulness.
To enable users to obtain benefits from IS, the system itself must be seen as useful and fit properly to user tasks [27]. More specifically, the study shows that users who perceive the system as useful and fits well with its work requirements,pereceive more positive and significant effect on their performance.

However, compatibility and adequacy of the systems were more important for the performance of the users while computer support was less effective in influencing the performance of the user [23- 28- 42]. This confirms the importance of compatibility and adequacy of user tasks. They reach more benefits when the systems have high compatibility and a better match with

their job requirements.

System quality and performance users:

The results of the study indicate that the quality of the system affects the performance of users, both directly and indirectly, which shows a strong direct correlation between measures of system quality and user performance. The study confirmed the main proposal of DeLone and McLean [21] in the same way as in the original model. In addition, in order to identify the most important measures of the system quality which contribute to user performance, a regression was made between the dimensions of the quality and performance of the system users.

The results show that the integration and reliability are the most important measures which contribute significantly to user performance and explain much of the variance in user performance.

Another important point is confirmed in this regard, is that the IS are designed for all levels of users and the results showed that IS are suitable for any type of user. This improves the user's ability to rely on these systems to carry out their tasks in different functional areas. This increases the usefulness of IS and confirms the integration as an inevitable result and a strategic factor that improves the performance of users in organisations. This is consistent with previous studies [29- 30- 31- 53].

Regarding the indirect impact of system quality on user performance thanks to perceived usefulness and ease of use as mediators, the results showed that these mediators affect the user performance. The results show that when IS are perceived as high quality systems by users, they are more likely to be perceived as more useful, leading subsequently to positive effects on the user performance. Similarly, the findings show that when IS are perceived as high quality systems for users, they are more likely to be perceived as easy to use [58].

Information quality and user performance:

Consistent with previous studies in different types of information systems, the results of the study indicate that the impact of information quality on user performance is positive and significant. This study showed the importance of the information quality as a key factor positively influencing user performance. These confirm the findings of previous studies [5- 10- 22].

All measures of the information quality were analysed to determine the importance of each measure and determine who has the most significant

contribution in predicting the user performance. Among these measures, the timeliness and completness were considered the most important attributes of information quality to assist users in performing their tasks when using IS.

IS users give great attention to the completeness of the information as it contributes significantly to their performance. They reported that the completeness of the information available through the IS helps them achieve their performance goals and improve the quality of work performed. The accuracy and relevance are very important to the users performance, and help in conjunction with the comprehensiveness to improve user performance. It leads to a more precise work with fewer errors, and users rely on systems to obtain the accurate information needed to perform their tasks and achieve their business goals. Finally, the availability of information also allows users to improve their efficiency and reduce the time spent in carrying out their tasks. The results indicate that perceived usefulness mediates the relationship between information quality and user performance. When SI provides high quality information, they are perceived as the most useful systems by users. This leads to impacts on the system performance more.

Similarly, the results show that the perceived ease of use is a key mediator between information quality and user performance relationship. The results show that the more users perceived IS ease of use the more they will have positive effects on user performance. The impact of information quality by perceived usefulness was slightly stronger than through the perceived ease of use. This implies that the information retrieved from the IS could be useful for the performance of users regardless of the perceived ease of use.

Theoretical and managerial implications:

This study provides further evidence of the appropriateness of extending the models of TTF, TAM and Delone & McLean as a useful means to provide an overview on the most important aspects of the IS impact on user performance. Therefore, the main theoretical contribution of this study to the theory of IS is the consolidation of three different models and the interrelationships between them to explain the impact of IS on user performance. In addition, the study goes further and provides an in-depth overview of the main measures of the factors studied. Previous studies have not provided an explanation of the dimensions of these factors and their importance in terms of impact and utility systems. First, the compatibility and adequacy as a measure of the FTT. Secondly, integration and reliability as

a measure of the quality system. Finally, the timeliness and completeness as measurement of information quality.

This research shows the importance of TTF explaining the impact of IS on user performance. Previous research on TTF, concentrated mainly on computing, focused on factors such as user satisfaction and the attention of users to use an information system [45]. The results of this study suggest the extension to other factors such as the information quality and the system quality is important to determine the impact on the performance and use of information systems.

Overall, the above results can be useful for the implementation and management of IS. Thus, the suitability and compatibility of IS users' needs and job requirements play an important role in improving performance. The information systems managers, suppliers and consultants must pay sufficient attention not only to improve the quality of IS as a product, but also to improve the quality of systems outcomes, quality of information and ability to align with user needs [71].

Conclusions

The impact of information systems on user performance and the relationship between information systems and user performance are the theoretical foundations of this study. The use of the TTF, the TAM and Delone and McLean model [21-22] to predict and explain the impact of IS on the users performance, helped identify key factors influencing the implementation of IS. The empirical validation of the IS impact model on user performance in a sample of 314 Tunisian users showed that the effects of implementation of the IS depends on the degree of user acceptance. The results of the study confirmed the results of previous studies [19] showing that user performance is more better that they perceive the system more useful and easier to use.

Previous studies that have examined the impact of IS on users indicated that system quality and information quality are very important factors that affect the benefits of use [22- 50]. This study demonstrated the importance of all the factors mentioned above and explored the relative contribution of each factor to the user performance.

The results showed that users think that the IS ability is to provide high quality information, which reduces errors and resolve performance problems when they occur. In addition, the TTF and the system quality play an

important role in improving the performance quality and increase the volume of users work. The results showed a satisfactory level of adjustment between IS and users needs and task requirements, taking into account the characteristics of IS.

Furthermore, perceived usefulness and perceived ease of use have proven to be very important factors that affect the use of the system and mitigate the impact on user performance. This is an opportunity for researchers and practitioners in IS to maximize IS impacts by improving training and organizational support in order to help users understand the benefits of using IS and improving adaptability of these systems with user needs.

Careful consideration of user needs and requirements of working in a particular industry will help designers and practitioners of IS design and implement IS in the light of the diversity of suppliers, designers, functionality of IS and industries [72].

In spite of insights provided by the results of this research and managerial implications arising, some limitations should be noted. Some measurement scales of variables could be improved, including scales measuring perceived usefulness and perceived ease of use. Another limitation is inherent in the non-consideration of the characteristics of users to measure users' performance based on sex, age, and experience.

In addition, most areas of research require further developments. Studying the impact of user characteristics on individual performance seems interesting.

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Appendix 1. List of items selected for measurement scales

Task Technology Fit	Compatibility	IS applications you use are suitable for your needs and help you to accomplish your tasks.	Compati1
		Applications that you IS I uses are compatible with your tasks.	Compati2
		IS applications are matched with the aspects of your work.	Compati3
	Meaning	Understanding of the information obtained from the company's IS on your task is easy to find.	Mean1
		The exact meaning of the information is obvious and clear on the company's IS.	Mean2
	Adequacy	The ISof the company meets your requirements of the task.	Adequa1
		The IS of the company is sufficient to handle your processing needs of your work.	Adequa2
	IT Support	You receive computer training you need.	ITSup1
		People with whom you are using IT include your work objectives.	ITSup2
		It is easy to get computer support and advice from other users when you are using the company's IS applications.	ITSup3
Source	Goodhue and Thompson, 1998; Kositanuritand al., 2006 ; Lin and Huang, 2008; Klaus and al., 2003; Abugabah and al., 2009 ; Kositanurit and al., 2011.		
Information quality	Accuracy	Your IS provides you with accurate information.	Accur
	Relevance	Your IS provides you with relevant information.	Relev
	Timeliness	Your IS provides you with the necessary information in a timely manner.	Time1
		The information contained in your IS is timely and regularly updated.	Time2
		Information from your IS time improves the quality of my work.	Time3
	Completeness	You can find complete information if necessary in your IS.	Complet1
		The information contained in your IS are sufficient to do your job.	Complet2
	Accessibility	The information contained in your IS are easily accessible.	Access1
		The information in your IS are easily retrievable.	Access2
		The convenience of the information in your IS saves time in your work.	Access3

Source	Wixom and Todd, 2005; DeLone and McLean, 2003; Abugabah and al., 2009 ; McGill and al., 2003		
System quality	Reliability	Your IS is reliable	Reliab1
		Your IS provides consistent information.	Reliab2
	Correctness	You find easier to correct your errors in your work with your IS.	Correct1
		Your IS helps you to reduce errors in your work.	Correct2
	Response time	Your IS reacts and responds quickly when you entered data.	Resptim1
		IS reacts and responds quickly to your questions.	Resptim2
	Integration	IS provides integration with other systems.	Integr1
		Your IS effectively combines data from different areas of the business.	Integr2
		Your IS is designed for all levels of users.	Integr3
Source	Wixom and Todd, 2005; Abugabah and al., 2009 ; DeLone and McLean, 2003; McGill and al., 2003		
Perceived usefulness		The use of IS is useful for the performance of your work.	Percuse1
		I can not do your job without IS.	Percuse2
		Your IS supports you in achieving the overall objectives of performance.	Percuse3
		With your IS, it is easier to do your job	Percuse4
Source	Davis,1989; Ahn and al.,2007; Amoako-Gyampah, 2007 ; King and He, 2006.		
Perceived ease of use		Your IS is user friendly.	Perceas1
		It is easy to learn to use your IS.	Perceas2
		You find your IS easy to use.	Perceas3
Source	Davis, 1989; Kositanurit and al., 2006; Staples and Seddon, 2004 ; Kositanurit and al., 2011 .		

User performance	Effectiveness	IS has a positive impact on your productivity	Effectiv1
		IS to reduce the time needed to accomplish your tasks	Effectiv2
		IS multiplies case you realize your work.	Effectic3
		Thanks to your IS in your work you can accomplish tasks faster	Effectiv4
		Your IS allows you to do more work than before.	Effectiv5
	Efficiency	Your IS improves the quality of your performance	Efficien1
		Your IS helps you to solve your employment problems	Efficien2
		Your IS reduces errors in your work performance	Efficien3
		Your IS improves your efficiency in your work.	Efficien4
	Creativity	Your IS improves user creativity	Creativ1
		Your IS helps you to create new ideas in your work	Creativ2
		Overall, the IS can achieve your employment goals.	Creativ3
Source	McGill and al.,2003; Goodhue and Thompson, 1995 ; Abugabah and al., 2009 ; Livari ,2005; Stone and al., 2006 ; Kositanurit and al., 2011 ; Hossain and al., 2012 .		

Variables	Dimensions	Items	Exploratory factor analysis		Confirmatory analysis	Joreskog rho
			Cronbach's alpha	Factor Contributions	Factor Contributions	
TTF	Compatibility	Compati1	0,784	0,848	0,789	0,815
		Compati2		0,718	0,674	
		Compati3		0,829	0,769	
	Adequacy	Mean1	0,848	0,796	0,848	0,848
		Mean2		0,801	0,710	
		Adequa1		0,791	0,745	
		Adequa2		0,781	0,747	
	IT Support	ITSup1	0,886	0,816	0,83	0,901
		ITSup2		0,902	0,885	
		ITSup3		0,872	0,885	

Information quality	Integration	Integr1	0,723	0,715	0,776	0,733
		Integr2		0,507	0,611	
		Integr3		0,745	0,726	
	Reliability	Reliab1	0,755	0,661	0,749	0,754
		Reliab2		0,637	0,637	
		Resptim1		0,651	0,624	
		Resptim2		0,230	Eliminated	
	Correcteness	Correct1	0,696	0,728	0,688	0,697
		Correct2		0,732	0,779	
Perceived usefulness	Perceived usefulness	Percuse1	0,948	0,882	0,934	0,950
		Percuse2		0,799	0,832	
		Percuse3		0,891	0,915	
		Percuse4		0,907	0,935	
Perceived ease of use	Perceived ease of use	Perceas1	0,904	0,839	0,855	0,905
		Perceas2		0,821	0,857	
		Perceas3		0,859	0,933	
Users performance	Effectiveness	Effectiv1	0,800	0,685	0,872	0,807
		Effectiv2		0,530	0,524	
		Effectic3		0,608	0,787	
		Effectiv4		0,503	0,610	
		Effectiv5	-	0,471	Eliminated	-
	Efficiency	Efficien1	-	0,185	Eliminated	-
		Efficien2	0,770	0,584	0,719	0,776
		Efficien3		0,608	0,793	
		Efficien4		0,569	0,601	
	Creativity	Creativ1	0,851	0,785	0,839	0,855
		Creativ2		0,776	0,768	
		Creativ3		0,778	0,790	