A comparative Study on acceptance technologies between an integrated Software (MAXIMO) and an ERP (SAP) in British Gas (BG) Tunisia

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Abstract
This study develops an extended model to compare (BG) Tunisia's user acceptance of MAXIMO and/or SAP Enterprise Resource Planning system for the Maintenance Planning, Work Orders and Inventory Management modules. This prediction is based on the technology acceptance model (TAM). The results show that the differences come down in four relationships. After rejecting the supposition of the explanation of Attitude towards Using by Perceived Ease Of Use, and the explanation of Perceived Usefulness by Personal Innovation and Information Accessibility, in the MAXIMO use, the same relationships are becoming confirmed in the case of SAP. On the other hand, the explanation Perceived Usefulness by Social Influence is confirmed in the MAXIMO use at a time it isn't in the case of SAP.

Keywords: **ERP,** Technology Acceptance Model, Perceived Ease of Use, Perceived Usefulness, Attitude toward Using, User Acceptance

The last five years have seen an explosion in the implementation of enterprise resource planning (ERP) systems, such as those offered by SAP. Recent research indicates that the market for ERP applications will grow by 32 per cent over the next five years representing 43 per cent of the applications' budgets of organisations. ERP systems are intended to provide standard application programmes that support the execution of activities throughout the organisation. In theory, they enable the integration of operations, through common data processing and communications protocols.

In June 2003, BG Tunisia, as part of all BG Group, implemented a Core System Wave 1 programme which consisted of implementing some components of a well known ERP system, SAP R/3. Three modules were implemented as part of the Wave1, these modules are: Finance, Procurement and Human Resources. The rest of SAP modules (Preventive Maintenance and Inventory Management) could be part of Wave2. Whereas maintenance management continues to run on different system without any impact on the introduction of SAP, the latter has affected the material management by splitting the purchases onto both systems, Maximo for stock items and SAP for non stock direct purchases.
The two systems are not automatically linked to each other. Financial transactions between Maximo and SAP are done manually. BG Tunisia cannot

sustain the usage of two different procurement systems for longer time, especially with the up coming new projects as only items which are stocked are controlled through the current materials management system, although equipment parts are also purchased directly, through the SAP purchasing system.

It is recommended to adopt a single material management system along with the cataloguing of stock items. An important point is to have a robust link between IM & PM modules for material reservation and traceability purposes. There are three options to be considered for overcoming this problem and improving the efficiency of the system:

- Do nothing
- Upgrade to Maximo 5 and the link to the existing SAP modules
- Use SAP modules for IM and PM.

The technical study and the comparison between the different options, in terms of feasibility, risks, implementation duration and cost estimates, has been completed and presented to the BG Tunisia management team. This latter have not taken yet the appropriate decision on which solution should be adopted. The most likely is that SAP will be adopted as a solution so the rest of SAP modules will be implemented to include the maintenance, work order and inventory management modules.
This study complements the technical feasibility previously done and will be based on the Technology Acceptance Model (TAM) to predict the user's acceptance for the SAP system. This study will help the management team to decide on the way forward and provides some guidance on the user preference for the ERP system to be adopted.

Literature review

According to the theory of reasoned action (TRA) model [1], an individual's performance in a specific behaviour is determined by his or her behavioural intentions, which themselves are jointly determined by individual attitudes and subjective norms. Building upon TRA, Davis proposed the Technology Acceptance Model (TAM) to explain and predict user acceptance of information systems (IS) or information technology (IT). Davis defined perceived usefulness (PU) as, ''the degree to which a person believes that using a particular system would enhance his or her job performance'', and defined perceived ease of use (PEOU) as, ''the degree to which a person believes that using a particular system would be free of effort''. Within TAM, PU is a major factor, and PEOU is a secondary factor, in determining system usage. Moreover, Davis suggested that PEOU has a positive, indirect effect on system usage through PU. Empirical studies of TAM have shown that usage of IS is determined by user behavioural intentions, which themselves are jointly determined by user PU and attitudes toward using the IS, the last of which are jointly determined by user PU and PEOU. This also has a positive but indirect effect on attitude through PU. Many IS studies have been conducted based on the TAM, since PU and PEOU are two general beliefs suited to predicting IS usage. All relevant empirical studies, such as the measurement of user acceptance of IT, and the self-reported usage of IS, have supported the hypothesis of TAM that PU is directly related to IT/IS usage. Different from prior studies, Venkatesh and Davis [00] have shown that PEOU has a positive, direct effect on user acceptance of IT.

However, no consistent conclusions have yet been reached about the effect of PEOU on IS/IT usage.

TAM assumes that an individual's information systems acceptance is determined by two major variables:

- **Perceived Usefulness:** the degree to which a person believes that using a particular system would enhance his or her job performance.
- **Perceived Ease Of Use:** the degree to which a person believes that using a particular system would be free of effort.

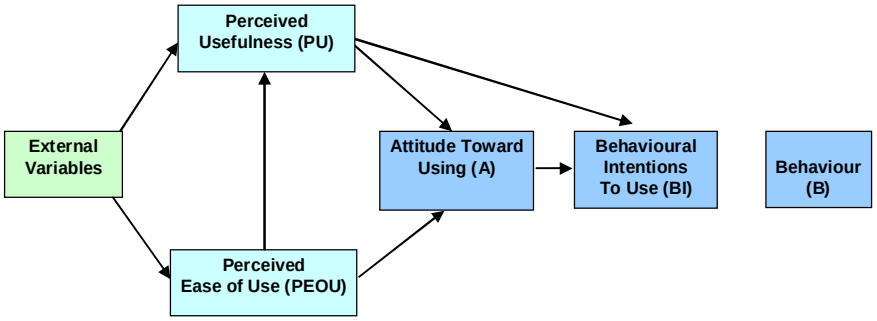

Figure 1: Technology Acceptance Model [6], [7]

During the past eighteen years, the information systems community considered TAM a parsimonious and powerful theory [16], [21]. Further supporting the notion of TAM's popularity, Venkatesh and Davis [00] found that the first two TAM articles, by Davis [89] and Davis and al. [89] received 424 journal citations in the Social Science Citation Index (SSCI) by the beginning of 2000.

TAM has been applied to different technologies (e.g. word processors, e-mail, WWW, GSS, Hospital Information Systems) under different situations (e.g., time and culture) with different control factors (e.g., gender, organizational type and size) and different subjects (e.g. undergraduate students, MBAs, and knowledge workers), leading its proponents to believe in its robustness. Currently, researchers in the IS field consider TAM one of the information systems fields' own theories, and still put much effort into the study of research using the theory [12].

Despite its great success, however, few previous systematic efforts trace its history or investigate and evaluate its findings, limitations, and future [8], [9], [12], [15]. Evaluation is crucial for the IS community in that it helps researchers of IS adoption understand TAM's past research findings, identify possible research topics, and conduct future studies. In addition, it helps educate current IS studies in examining how a well-known IS-owned theory evolved.

The chronological progress of TAM research

TAM did not maintain its original form. Like an organic being, TAM has ceaselessly evolved. TAM has made progress by dividing the past 18 years into four periods: introduction, validation, extension, and elaboration (Figure 2).

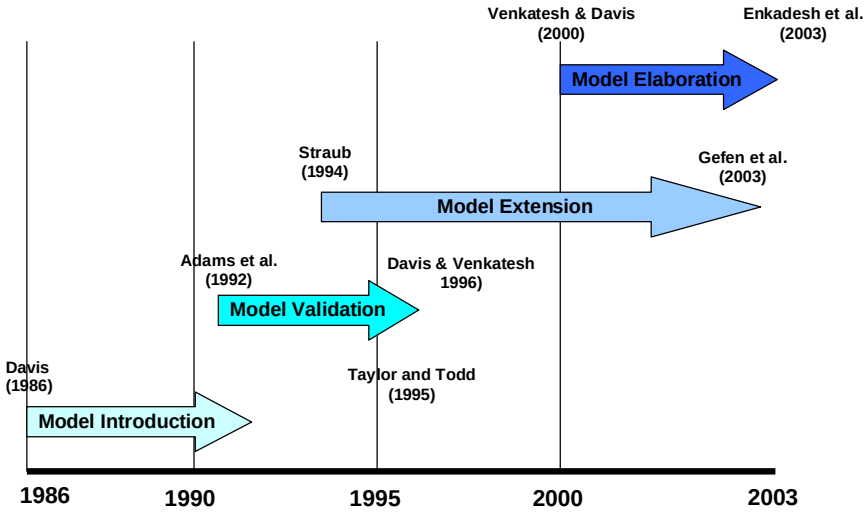

Figure 2: Chronological Progress of TAM Research [19]

Retained Conceptual Model

Based on the belief–attitude–intention–behaviour relationship in the TRA, this study proposes a model (Figure 3) extending TAM to predict SAP & MAXIMO user behaviour. The model not only includes PEOU, PU, attitudes toward systems usage and user acceptance, but also adopts some relevant external variables (Perceived Compatibility, Social Influence, Personal Innovation and Information Accessibility) by following Davis's TAM involving system variables.

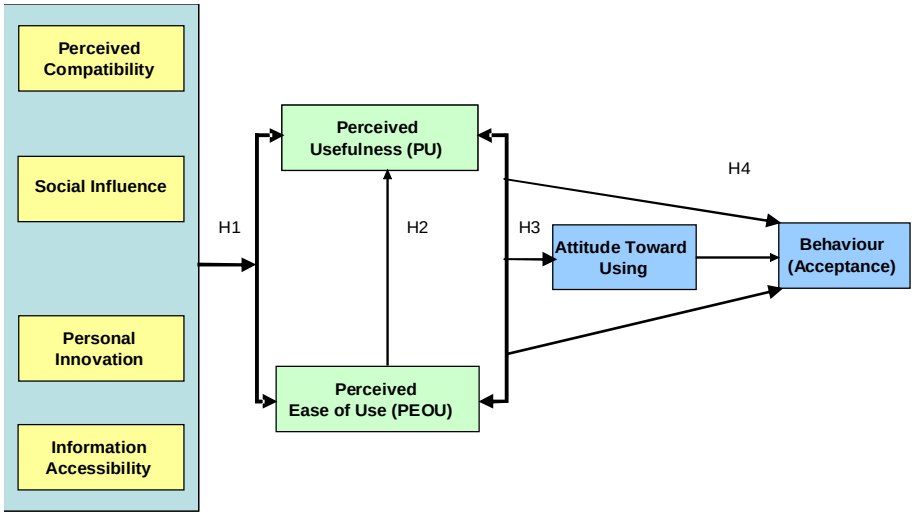

Figure 3*:* Proposed TAM extended model & Associated Hypothesis

Variables description

Attitude Toward the ERP: According to the operational definition of TRA, individual attitudes toward behaviour are determined by individual affective beliefs about behavioural consequences and the evaluations of

them. As proposed in TRA and TAM, attitude was expected to influence behavioural intention in using an IS. Thus, this study postulates that individual attitudes toward ERPs affect user acceptance behaviour) [3].

Perceived Usefulness: the degree to which a person believes that using a particular system would enhance his or her job performance. According to the postulates and empirical results of TAM, the original PU is positively correlated with user attitudes toward an ERP and its use. We consider the PU to be perceived value (or perceived benefit), defining it as effectiveness of ERPs as perceived by the user. After revising Davis's definition of PU, the PU of ERPs is defined as, the degree to which an individual believes that using the ERP (SAP or Maximo) would enhance the effectiveness of his or her job [4].

Perceived Ease Of Use: the degree to which a person believes that using a particular system would be free of effort. Although Davis found that PEOU is positively correlated with system usage, he inferred that PEOU does not affect system usage if PU is under control. However, the positive relationship between PEOU and usage intentions was also suggested by Venkatesh and Davis. An analysis of the influential differences among prior studies shows that the effect of PEOU on IS/IT usage decreases with increasing user familiarity with the IS/IT. Restated, PEOU does not affect IT usage if the complexity of IT is very low. The following hypotheses about PEOU will be tested here to explore the antecedent–consequence relationships in the extended model [4].

Information Accessibility: the ability to retrieve the desired information from the system.
Perceived Compatibility: is the degree to which an innovation is perceived as being consistent with the existing values, needs, and past experiences of potential adopters.

Personal Innovation: An individual trait reflecting a willingness to try out any new technology.

Social Influence: important to him think he should or should not perform the behaviour in question.
Derived hypothesis

Our model tests three central hypotheses. First of all we will test the signification of the effect of Attitude Toward Using on User Acceptance. Behind this, we will try to explain the variance of Attitude Toward Using and User Accepatnce by Perceived Usefulness and Perceived Ease Of Use. Than, it will be important to test the supposition of the effect of Perceived Ease Of Use on Perceived Usefulness. Finally the big block, pretends explaining Perceived Usefulness and Perceived Ease Of Use by Perceived Compatibility, Social Influence, Personal Innovation and Information Accessibilty. The details of all hypothesis are showed below:

H1: External factors (Perceived Compatibility, Social Influence, Personal Innovation, Information Accessibility) positively affects the Perceived Ease Of Use and Perceived Usefulness of [SAP or MAXIMO].
H2: The Perceived Ease Of Use (PEOU) positively affects Perceived Usefulness (PU) of [SAP or MAXIMO].
H3: The Perceived Ease Of Use (PEOU) and Perceived Usefulness (PU)

positively affects individual Attitudes toward [SAP or MAXIMO].

H4: The Perceived Ease Of Use (PEOU), Perceived Usefulness (PU) and Individual attitudes toward [SAP or MAXIMO]. positively affect user acceptance of [SAP / MAXIMO].

Research Methodology

The empirical study tests the extended model using a questionnaire-based survey to explore the possible antecedent–consequence relationships in British Gas (BG)Tunisia owned BG group. A leading player in the global energy market, BG Group is a dynamic growing business with operations in 20 countries over five continents. While the headquarters are in United Kingdom (UK), over 60% of the talented professionals who make up the BG team are located outside the UK. BG Group has a proud history in all aspects of the energy sector, particularly natural gas, where BG Group has experience across the entire gas chain – from exploration to delivery to the consumer

BG Tunisia started its activities in 1990. Since that, different Information Management Systems (IDEAS, MAXIMO, COMSHARE, PROCON, CM, etc.) were used to support the company's activities in the different business areas. At the beginning we could not talk about an Enterprise Resource Planning System as many non integrated software and systems were used separately without interlinks or interfaces. In June 2003, BG Tunisia, as part of all BG Group, implemented a Core System Wave1 programme which consisted of implementing some components or of a well known ERP system: SAP R/3. Three modules were implemented as part of the Wave1, these modules are: Finance, Procurement and Human Resources. The rest of SAP modules (Preventive Maintenance and Inventory Management) could be part of Wave2. Figure 4 traces the historical evolution of the systems within BG Tunisia from 1990 till 2005 by business area and software.

This research is conducted as a field survey. The use of a field survey is appropriate for many reasons. It would be more difficult to effectively manipulate the variables identified in the research model using an experimental design. One reason is that a relatively large number of independent variables would have to be manipulated. Another reason is that manipulation of some of the independent variables would require significant time and/or monetary resources to accomplish.

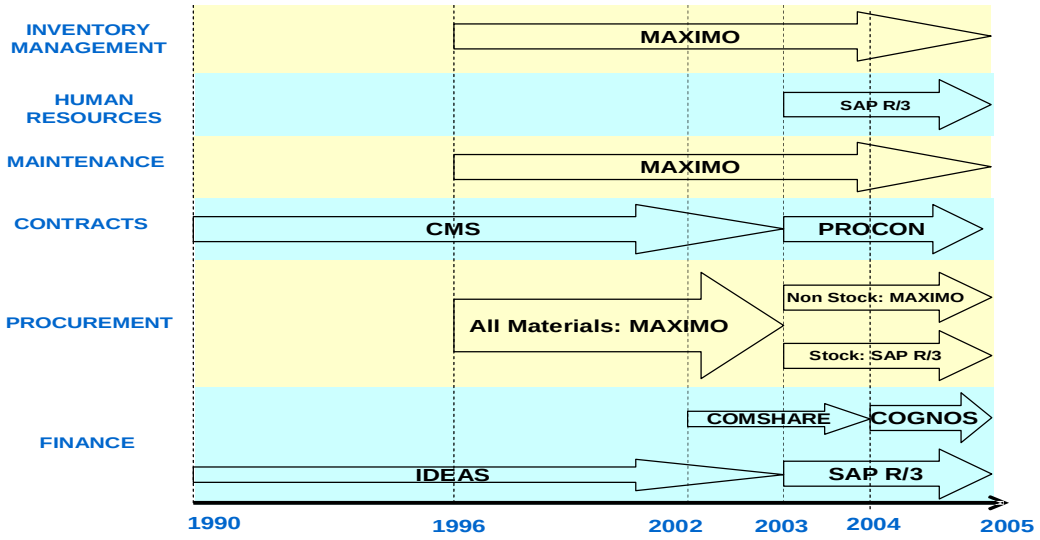

Figure 4: BG Tunisia's ERP system history

The field survey is conducted in two stages: a pilot study and the full study. The purposes of the pilot study are to test the data collection procedure, validate the survey questionnaire, and provide data for initial tests of hypotheses. A convenience sample for the pilot study is drawn from the same population as that of the full study. Following the analysis of data from the pilot study as well as making required minimal changes to the questionnaire, the full study was conducted on a larger sample of Maximo and SAP potential users.

Survey questionnaire

We developed an SAP survey questionnaire using Sphinx Lexica software version 4.5. The survey was built to capture each of the constructs in the research model. Most of the theoretical constructs were operationalized using validated items from prior researches. The items measuring perceived usefulness and perceived ease of use were derived from Taylor and Todd [95]. The items measuring attitude toward system use were adopted from Nah and al. [02]. The items measuring Information Accessibility, the Perceived Compatibility and the Personal Innovation were adopted from Green and Hevner [99].

Data to test the research hypotheses were collected via the questionnaire developed for this study. The questionnaire was pre-tested with some SAP and Maximo users from Production and Maintenance disciplines in order to ensure content validity. The results of pre-testing were:

- shortening of the questionnaire to reduce the time needed to complete it to approximately 20 minutes; this "shortening" was accomplished via item deletion and reformatting of rating scales
- deletion of items that do not appear to adequately tap the variable being measured
- reformatting of rating scales such that a similar 5-point Likert scale was used for most questions
- modifications in item wording for clarity

The questionnaire contains eight sections: (1) Personal Details, (2) Perceived Ease of Use, (3) Perceived Usefulness, (4) Attitude Toward Using, (5) Perceived Compatibility, (6) Information Accessibility, (7) Personal Innovation, and (8) Social Influence. With the exception of section 1, the majority of items contained in the questionnaire use 5-point Likert scales ranging from "strongly disagree" to "strongly agree". The survey respondents were asked to indicate agreement with each statement in a measure using a five-point Likert-type scale (1, strongly disagree; 2, disagree; 3, neutral; 4, agree; 5, strongly agree).

Data collection

The questionnaire was sent to the survey population. Out of the surveys distributed to 80 Maximo and SAP end-users, 65 usable responses were received, resulting in an overall response rate of 82%. This rate is explained by the administration method (face to face) of this questionnaire which has done by the quality director of British Gaz;

Table 1: Descriptive sample analysis

Variable	Value	Chi-Square test
Gender o male o female	 97 % 3 %	 57.24
Age	Mean = 39.6 Range= 26 - 54	46.69
Position o Cadre o Maitrise o Execution	 12.3 % 80 % 7.7 %	 63.9
Department o Finance o Maintenance o Supply Chain o Engineering o Hannibal Production o Miskar Production o Production Services o Others	 3.1 % 21.5 7.7 % 10.8 % 40 % 13.8 % 1.5 % 1.5 %	 62.13
Total Work Experience	Mean = 15.4 Range= 2 - 35	18.6
Experience with BG Tunisia	Mean = 8.6 Range= 1 - 16	98.15
Computer Experience o Some Experience o Experienced o Very Experienced	27.7 % 67.7 % 4.6 %	 39.72
SAP Experience o SAP users o Non SAP users	 35.4 % 64.6 %	 5.6

The majority of the SAP & Maximo end-users were production technicians, maintenance technicians and supply chain staff. Male users comprise 97% of the sample, which is consistent with the user population (production and maintenance). In terms of computer experience, 100% of the respondents are familiar with the computer usage.

Results and analysis

In our study, we have eight variables which are presented by two or three or four attributes. First of all we will use the factor analysis in order to try to understand if the items representing the perceptions of each variable can be grouped and reduced in a smaller number. The results indicated that the perceptions are being grouped in only one factor for each variable. In the two cases (SAP and Maximo), factor analysis, with Varimax Rotation, showed that all the rates of Kaiser-Mayer-Olkin are higher than 0.5 which prove an adequate distribution of values for conducting factor analysis. Also in our analysis, the values of Bartlett test of Sphericity are significant, they are lower than 0.05.

Table 2: Results of factor analysis and reliability (Maximo and SAP)

Conceptual variables	Code of each factor extracted	Percentage of explicated variance		Kaiser-Meyer-Olkin Measure (KMO)		Cronbach Alpha (α)	
		MAXIMO	SAP	MAXIMO	SAP	MAXIMO	SAP
Perceived Compatibility	PERCOMP	88,022% (2,641)	81,116% (2,433)	0,759	0,678	0.93	0.88
Social Influence	SOCINF	94,328% (1,887)	92,473% (1,849)	0,500	0,500	0.94	0.92
Personal Innovation	PERSINN	83,516% (2,505)	89,586% (2,688)	0,737	0,719	0.90	0.94
Information Accessibility	INFOACC	80,211% (2,406)	89,872% (2,696)	0,692	0,744	0.87	0.94
Perceived Usefulness	PERUSE	84,691% (3,388)	88,551% (3,542)	0,853	0,851	0.94	0.96
Perceived Ease Of Use	PEREASE	79,270% (3,171)	86,144% (3,446)	0,823	0,859	0.91	0.94
Attitude Toward Using	ATTOUSI	67,758% (2,710)	75,266% (3,011)	0,713	0,786	0.83	0.89
User Acceptance	USACCEP	73,838% (2,954)	89,482% (3,579)	0,830	0,861	0.88	0.96

This indicates also that these data are acceptable for factor analysis. Than, each variable is becoming presented by only one factor. Tables presenting Total Variance Explained and Component Matrix, can explain clearly the percentage of variance of each factor extracted for each variable. The test of reliability indicated good and excellent values of Crombach Alpha (>0.80 and >0.90). All the variables are normally distributed. They will be used later in order to validate the model and the hypothesis.

Predicting User Acceptance and Attitude Toward Using by Perceived Usefulness and Perceived Ease Of Use (H3)

Following the model illustrated in figure 3, we begin our empirical study by testing the correlation between the first independent set of factors

(Perceived Usefulness and Perceived Ease Of Use) and the second dependent set of factors (Attitude Toward Using and User behaviour). The most suitable technique is the canonical correlation.

Outputs provide alternative tests of significance. The usual one is Wilks's lambda, which tests the significance of the canonical correlation. The significant of F, is lower than 0.05. The two sets of variables are significantly associated by canonical correlation. The ratio of the eigenvalues below is the ratio of explanatory importance of the two canonical correlations (labled roots) which are extracted for these data. For these data, for the first canonical correlation the covariate (Perceived Usefulness and Perceived Ease Of Use) canonical variable explains about **80,4%** (0.897*0.897) of the variance in the dependent (Attitude Toward Using and User Behaviour) canonical variable.

Table 3: Results of canonical analysis

Independent variables	Dependent variables	Beta coefficient		Significant		Percentage of variance		Significant of variance	
		MAXIMO	SAP	MAXIMO	SAP	MAXIMO	SAP	MAXIMO	SAP
Perceived Usefulness	Attitude Toward Using	0.688	0.374	0.000	0.000	73,5	80,4	0.000	0.000
	User Acceptance	0.591	0.321	0.000	0.009				
Perceived Ease Of Use	Attitude Toward Using	0.203	0.551	0.025	0.000				
	User Acceptance	0.233	0.546	0.027	0.000				
	Perceived Usefulness	0.608	0.797	0.000	0.000	36	63	0.000	0.000
Attitude Toward Using	User Acceptance	0.725	0.826	0.000	0.000	51,9	67,8	0.000	0.000
Perceived Compatibility	Perceived Usefulness	0.649	0.322	0.000	0.013	71,8	79,1	0.000	0.000
	Perceived Ease Of Use	0.192	0.127	0.138	0.231				
Social Influence	Perceived Usefulness	0.314	-0.018	0.000	0.847				
	Perceived Ease Of Use	0.010	0.006	0.911	0.941				
Personal Innovation	Perceived Usefulness	-0.075	0.246	0.353	0.014				
	Perceived Ease Of Use	0.254	0.141	0.011	0.108				
Information Accessibility	Perceived Usefulness	0.088	0.011	0.405	0.340				
	Perceived Ease Of Use	0.435	0.666	0.001	0.000				

Then, we proceed to regress each dependent variable on the set of covariate variables. Following the outputs, Perceived Usefulness and Perceived Ease Of Use explain significantly the variance (about 80% as showed later) of the factors set Attitude Toward Using and User Behaviour. All the possible different relationships between the factors are approved, as the significant of (t) showed. Compared to the Maximo case, outputs showed that the set of Perceived Usefulness and Perceived

Ease Of Use explain significantly the variance of the set of Attitude Toward Using and User acceptance, except the Perceived Usefulness on User Acceptance, by 73,5%.

Predicting User Acceptance by Attitude Toward Using (H4)

The following step considers to predict User Acceptance by Attitude Toward Using. Using stepwise linear regression, the regression model retains the independent variable Attitude Toward Using as adequate for predicting User Acceptance. Attitude Toward Using have a strong positive effect on User Acceptance (Beta = 0.826 significant at 0.01). This regression model explained about 67,8% of the variance in User Acceptance of SAP system (significant at 0.01 level). In the case of Maximo, Attitude Toward Using were found having strong positive effect on Use Acceptance (Beta = 0.725 significant at 0.01 level). But, as showed, values obtained in this case are lower than the others obtained in the case of SAP system.

Predicting Perceived Usefulness by Perceived Ease Of Use (H2)

After this analysis, we try to predict Perceived Usefulness by Perceived Ease Of Use. Following the same procedures, the stepwise regression model retains the independent variable Perceived Ease Of Use as adequate for predicting Perceived Usefulness. Perceived Ease Of Use have a strong positive effect on Perceived Usefulness The regression model explained about 63% of the variance in perceived Usefulness and is statistically significant at 0.01 level. In the case of Maximo and after obtaining the regression model which predicts Perceived Usefulness by Perceived Ease Of Use. For example, the model shows significant rate of variance which is about 36%.

Predicting Perceived Usefulness and Perceived Ease Of Use by Perceived Compatibility, Social Influence, Personal Innovation and Information Accessibility (H1).

We continue our analysis by testing the relationship between the dependent variables set (Perceived Usefulness and Perceived Ease Of Use) and the independent variable set (Perceived Compatibility, Social Influence, Personal Innovation and Information Accessibility). Based on the same methodology of analysis followed when predicting User Behavior and Attitude Toward Using by Perceived Usefulness and Perceived Ease Of Use. The results provide alternative tests of significance. As noted, the usual one is Wilks's lambda, which tests the significance of the first canonical correlation. The significant of F is lower than 0.05. The two sets of variables are significantly associated. The ratio of the eigenvalues below is the ratio of explanatory importance of the two canonical correlations (labled roots) which are extracted for these data. For these data, for the first canonical correlation the covariate (Perceived Compatibility, Social Influence, Personal Innovation and Information Accessibility) canonical variable explains about **79,1%** (0.889*0.889) of the variance in the dependent (Perceived Usefulness and Perceived Ease Of Use) canonical variable. Then, we proceed to regress each dependent variable on the set of covariate variables. Following the outputs, Perceived Compatibility, Personal Innovation and Information Accessibility explain significantly the variance of the Perceived Usefulness and the variables set composed of Personal Innovation and Information Accessibility explain significantly also the variance of Perceived Ease of Use. In the case of Maximo system, the significant

variance of the Perceived Usefulness and Perceived Ease of Use is about **71,8%**. Perceived Usefulness is explained by Perceived Compatibility and Social Influence whereas Perceived Ease of Use is explained by Personal Innovation and Information Accessibility.

Table 4: Summary of hypothesis results

Hypothesis	Adjacent hypotheses	Independent Variable	Dependent Variable	Supported? ***MAXIMO case***	Supported? ***SAP case***
H4	**H_{4a}**	Attitude Toward Using	User Acceptance	Yes	Yes
	H_{4b}	Perceived Usefulness		Yes	Yes
	H_{4c}	Perceived Ease Of Use		Yes	Yes
H3	**H_{3a}**	Perceived Usefulness	Attitude Toward Using	Yes	Yes
	H_{3b}	**Perceived Ease Of Use**		**No**	**Yes**
H2	**H_{2}**	Perceived Ease Of Use	Perceived Usefulness	Yes	Yes
H1	**H_{1a}**	Perceived Compatibility		Yes	Yes
	H_{1b}	**Personal Innovation**		**No**	**Yes**
	H_{1c}	**Information Accessibility**		**No**	**Yes**
	H_{1d}	**Social Influence**		**Yes**	**No**
	H_{1e}	Perceived Compatibility	Perceived Ease Of Use	No	No
	H_{1f}	Personal Innovation		Yes	Yes
	H_{1g}	Information Accessibility		Yes	Yes
	H_{1h}	Social Influence		No	No
		Final Results		**9 hypothesis supported**	**11 hypothesis supported**

As first notes deducted from these data analysis, we noticed that there are differences between results of MAXIMO and SAP cases. When testing the model in SAP case (Tne new arrival of hardware in British GAZ), the percentenge of variance explained is higher than the one deducted in the case of MAXIMO. This first statement leads us to look at the validation of the different relationships existing between variables of the model. That's why, we have established the table below which summarize the details of the results in the cases of MAXIMO and SAP (new comer in British GAZ).

Following these results, eleven hypotheses are supported in the case of SAP contrary to only nine in the case of MAXIMO. This confirms the improvement of the results obtained in the new case. The differences come down in four relationships. The first one is the explanation of Attitude toward Using by Perceived Ease Of Use. In the case of MAXIMO this hypothesis is not supported but it is, in the case of SAP. This demonstrates that using SAP system is perceived as easy for the staff of

British GAZ Tunisia. It appears that good approval towards using SAP is explained by the enhancement of learning of the use. The next relationship in which it exist the differences is between Perceived Usefulness and, Personal Innovation and Information accessibility. These last two variables are becoming explained in the case of SAP. This shows that the approval of the staff towards the efficiency of SAP system is understandable essentially by liking the new experience of SAP and the facility of retrieving desired information. The last relationship pretends the opposite in relation to the mentioned before. The explanation of the Perceived Usefulness by Social Influence is becoming not supported. SAP seems to reduce social importance of the respondents. No way for the explanation of the approval of the staff towards the efficiency of SAP by people who are important and can influence the behaviour of users.

Discussion, conclusion and limitations

This research deals with the prediction of user acceptance for the SAP system as an ERP compared with MAXIMO. Specifically, we have investigated what factors could contribute to the user acceptance of MAXIMO and SAP in the organisation. The goal of this research is to improve the efforts to understand the external variables that effect user acceptance in the ERP adoption.

The results of this study confirm that the differences come down in four relationships. The first one is the explanation of Attitude toward Using by Perceived Ease Of Use. In the case of MAXIMO this hypothesis is not supported but it is, in the case of SAP. This demonstrates that using SAP system is perceived as easy for the staff of British GAZ Tunisia. It appears that good approval towards using SAP is explained by the enhancement of learning of the use. The next relationship in which it exist the differences is between Perceived Usefulness and, Personal Innovation and Information accessibility. These last two variables are becoming explained in the case of SAP. This shows that the approval of the staff towards the efficiency of SAP system is understandable essentially by liking the new experience of SAP and the facility of retrieving desired information. The last relationship pretends the opposite in relation to the mentioned before. The explanation of the Perceived Usefulness by Social Influence is becoming not supported. No way for the explanation of the approval of the staff towards the efficiency of SAP by people who are important and can influence the behaviour of users.

Our study thus suggests that providing users with a system with ease access to the information, or a system which is compatible with the way they work would indirectly improve their acceptance of the ERP (SAP). Equally, increasing their perceptions of the usefulness and ease of the ERP would directly improve their acceptance of the ERP via creating positive attitudes.

This research makes some contributions to the research community as well as the ERP and SAP implementing community:

- An extension of TAM model
- The development of an integrated model of SAP adoption
- Identifying additional indicators of SAP adoption success
- Identifying factors that impact SAP adoption success

Organisations and ERP developing and implementing companies will find support and guidance for successfully introducing new systems into practice.

Every effort has been made in this research to develop a comprehensive research framework, develop reliable and valid measures of study variables, and analyze the study data using robust and powerful statistical techniques. Further, a research design was chosen that maximizes generalizability of research findings to the ERP development community. However, limitations of this research do exist and are discussed next.

The extended model should be interpreted carefully when applied to predict the SAP user behaviour of inexperienced SAP users, or extending the results to other users. Only 35.4% of the respondents had SAP experience, which may lead to opposite cognitive impacts on assessing individual PU and PEOU of SAP adoption between experienced and inexperienced users. This phenomenon is different from that of prior studies, which assessed the PU and PEOU from experienced users. Basically, the model was used to predict respondent willingness (user acceptance) to adopt SAP via the theoretical determinants of ERP/SAP behaviour in prior studies. Perhaps the most obvious limitation of this research is the low sample size, which resulted in the use of a series of multiple regressions in order to test the research model.

However, because the research model represents a structural model with both latent and observed variables, a more powerful statistical technique such as structural equation modelling would have been a more desirable way to test the adequacy of the research model to describe the sample data. Thus, a recommendation for future research is to repeat this study with a larger sample size (a minimum of 100 has been suggested by Hayduk , although most recommendations suggest 200–400 respondents) [11].

The research framework for Software Development Technique Diffusion developed in this paper integrates ideas and theories from previous researches. Thus, this framework is robust and provides increased understanding of the ERP adoption process. However, there are variables, which are not included in the present framework that may provide greater explanatory power as well as greater understanding of some of the non-supported research hypotheses. I would recommend that additional variables should be considered in future enhancements to the current model: System Complexity, End User Support, Visibility and Management Support. These variables may possibly interact with perceived usefulness or perceived ease of use to affect the impacts on ERP user acceptance.

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Annexe 1

Variables/Likert Scale (1-5)
Perceived Usefulness o Using SAP would increase my productivity at work o Using SAP system will make my work more efficient o Using SAP system will increase my job performance o I would find SAP useful at work
Perceived Ease Of Use o Learning to operate SAP would be easy for me o I would find it easy to get SAP to do what I want it to do o It would be easy for me to become skilful at using SAP o Overall, I would find SAP easy to use
Attitude Toward Using o Using SAP is a good idea o Using SAP is a wise idea o I like the idea of using SAP to perform my job o Using SAP would be pleasant
User Acceptance o I am enthusiastic about using the SAP system o I am excited about using the SAP system in my workplace o It is my desire to see the full utilization and deployment of the SAP system o I am willing to accept using SAP
Perceived Compatibility o The setup of the SAP system is compatible with the way I worked before o Using SAP is compatible with the way I like to work o The setup of the SAP system is compatible with my style of work
Personal Innovation o I am willing to try out SAP o I like the idea of trying out SAP o I like to experiment with SAP
Information Accessibility o With SAP it would be easy to retrieve the desired information o With SAP it would be efficient to retrieve the desired information o With SAP it would not be complex to find out the required information
Social Influence o People who influence my behaviour would think that I should use SAP o People who are important to me would think that I should use SAP