## Critical Examination of the Role of National Culture and Psychology on Acceptance and Use of Enterprise Resource Planning Systems

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#### Abstract

The purpose of this research was to examine the role of national culture on acceptance and use of enterprise resource planning (ERP) systems. In order to examine this, Schlumberger Inc.'s Saudi Arabia operations was chosen.

Methodologically, the topic was inquired from the positivist stance. In this light, the author adopted quantitative methodologies, derived variables deductively from the existing literature and tested assumptions with the observations collected from the selected company. In this process, the author utilised cross-sectional research strategy and applied surveys in the collection of primary data. In the analysis statistical methods were used for the data collected from 244 respondents who were selected purposively. The findings showed that user flexibility positively and significantly influences usefulness of ERP system, enhances user opinions about the benefits of the system and positively and significantly influences attitudes of individuals. Positive attitudes towards ERP system is related to communication and training endeavours of employers which increases perceived ease of use thanks to development of positive user opinions about the benefits of the new system. These findings implied that cultural factors, particularly power distance and uncertainty avoidance significantly affect acceptance and utilisation of ERP systems in high power distance and high uncertainty avoidance cultures.

Keywords: ERP, Saudi Arabia, Culture, Schlumberger

#### Introduction

Since the beginning of the 1990s, ERP systems have been perceived as the catalyst for movement of technology away from old legacy systems. Kumar, Maheshwari and Kumar (2002) define ERP as a system designed to integrate an organisation's information processes and systems within and across functional business areas using configurable information systems modules. ERP is a type III information system (IS) development which is produced by the system's capacity to integrate with primary business processes and strategies that have a significant influence on organisational success (Sambamurthy, Bharadwaj & Grover, 2003). Owing to its strategic relevance, many organisations incorporated adoption of ERP as an essential component in information technology strategy (Han, 2004). Chung and Snyder (2000) propose that the shifting business environment

characteristic of the early 1990s added to the increasing popularity of ERP as an IS. ERP is now well established in the world of business. According to Nah, Lau and Kuang (2001) and Kogetsidis, Kokkinaki and Soteriou (2008), successful deployment of ERP systems is renowned for bringing considerable benefits which include enhanced customer services, improved production planning and decreased production costs.

However, Akkermans and Van Helden (2002) point out that ERP system deployment is a complex process. Law and Ngai (2007) highlight discussions around successes and failures of ERP deployment where the number of ways to fail in ERP deployment is greater than ways in which to succeed.

Indeed, the favourable outcome rate for successful ERP deployment is not high. According to Martin (1998), more than 90% of ERP deployments run over budget on time and cost. Zhang, Lee, Zhang and Banerjee (2002) point out that only 33% ERP deployments succeeded. Umble, Haft and Umble (2003) state that the time and cost involved with ERP implementation impacts negatively on the

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true capacity of ERP systems while ERP deployment failures resulted in earnest deliberation to identify aspects with the most significant influence on ERP implementation success. Umble et al. (2003) also that highlight the fact purchase and implementation of ERP software packages with the capacity to integrate and manage multiple functional business processes throughout an organisation and across multiple territories requires a substantial financial investment running into millions of dollars and also forces disruption as organisational change is implemented. In this context, Skok and Doringer (2001) point outgrowth in the recorded number of ERP failures and suggest that both behavioural and technical issues play roles in deployment failures. Chatfield (2000) proposes that organisational structure and culture significantly impact the ERP deployment process. In fact, Al-Gahtani, Hubona and Wang (2007) explain that determination if the similar models are applicable across cultures or not is the first required element in order to achieve two targets. According to them, those targets are (1) improvement of comprehension related to cultural implications of IT acceptance and (2) enhancement of organisational management worldwide. In order to investigate IT utilisation and adoption in Arab world Rose and Straub (1998) conducted a research. The diffusion of personal computing is evaluated in their study. In order to achieve this, a modified TAM is applied utilising a cross-sectional survey including 274 knowledge employers in five Arab nations including Jordan, Saudi Arabia, Sudan, Lebanon and Egypt. As a result, Al-Gahtani et al. (2007) found that there is an almost 40% of variance between the nations in terms of the technology acceptance and usage. Therefore, the aim of this study was set as to examine the role of national culture on acceptance and use of ERP systems. To conduct this study Schlumberger Inc.'s Saudi Arabia operations was chosen. Schlumberger Inc. is considered as one of the world's largest oil and gas service provider and newly implemented an ERP system in its operations. The implementation in North America was tested and claimed that it was a successful implementation. However, despite the fact that Schlumberger Inc.'s North American operations successfully accepted the ERP changes, it can be said that full potential of ERP adoption in its operations in Saudi Arabia may not have been observed by the company because of the effect of the culture on the acceptance and use of ERP systems. It should be noted that conducting this study is not only useful for Schlumberger Inc. (since according to results of this study the company can

increase the benefits gained by the adoption) but also useful for the academic world to confirm the role of culture on the adoption of ERP systems. For the purposes of this research project, investigation is based on cultural dimensions established by Hofstede (1985) in Saudi Arabia with specific reference to Schlumberger Inc.'s Saudi Arabia operations.

#### Enterprise Resource Planning (ERP) System

Baki, Dereli and Baykosoglu (2004) state that one of the most helpful tools available for improved planning, organisation and control of production is known as an enterprise resource planning (ERP) system. This type of system is used by a company to administer and control the resources that are required to run the business; these resources include physical, financial, and human assets (Sprecher, 1999). Tanyas (1997) states that an ERP system satisfies both company objectives and customer needs using a software package which enables well-organised planning, as well as control of the supply, manufacturing, and distribution chain even if these components are separated geographically.

Rather than being a solitary application, ERP is an integrated system. It encompasses various parts of the business and brings them together in a cohesive way to enable the smooth flow of information between areas such as finance, accounting, production and the personnel department (Amoako-Gyampah & Salam, 2004).

These highly-advanced software units may include tools and applications for areas such as marketing and sales, product distribution, finance and accounting, production control, resource management, personnel management, computercontrolled manufacturing, supply chain management, and customer communication (Boykin, 2001; Chen, 2001; Yen, Chou & Chang, 2002). In fact, ERP system software can be used to coordinate the activities within the entire supply chain, both internal and external, involved in bringing products to market (Al-Mashari & Zairi, 2000; Shehab, Sharp, Supramaniam & Spedding, 2004).

One of the primary goals of ERP from a management perspective is to increase the company's competitive advantage by the quick and accurate access to company data (Beheshti, 2006). One database will integrate all the information from various parts of the company, such as manufacturing, sales, personnel, accounting and marketing (Saatcioglu, 2009).

Reaching the greatest possible efficiency within

an organisation is the ultimate goal of implementing a company-wide ERP system. The installation of this new system may have other related effects, including decreased inventory requirements or better use of manufacturing facilities (Ragowsky & Somers, 2002). ERP can also assist a business in providing more relevant products and services for their customers; in addition, it will increase the information available to the company regarding its supply, demand, and production systems (Mehrjerdi, 2010). Businesses may experience an elevated number of valueadded sales due to increased customer interaction and more product selection (Beheshti, 2006).

To determine the benefits of ERP, Shang and Seddon (2002) developed a model which outlined the benefits at five different levels. According to the scholars, owing to the automation of business process, firms gain operational benefits. The benefits are also seen at managerial level as ERP system improves planning and monitoring capabilities of managers in managing resources. The framework of Shang and Seddon (2002) also touches upon the strategic benefits of ERP by indicating assistance of ERP system in expansion of business and gaining competitive advantages thanks to the improved planning and monitoring capabilities. According to Shang and Seddon (2002), ERP system, despite the requirement for high level of capital in implementation, provides benefits at IT end of operational functions. The key benefit is decline in the expenses made on maintaining the IT infrastructure. The fifth and final level where the benefits of ERP system occur is the overall organisation. The most important organisational advantage realised in empowerment of employees and knowledge sharing. Davenport and Brooks (2004) also reported similar benefits of ERP which included reduction in time spent between manufacturing/production of product/services and its delivery to customers, enhancement in flow of information horizontally and vertically within organisations, increase in speed of creating accounting and financial information, increase in availability of detailed data that is required for developing strategies and tactics and bringing electronic commerce to the forefronts of organisational dealings. Wenrich and Ahmad (2009) outlined the benefits of ERP systems as improved and more efficient work flow, more accessible and higher quality data to enable improved decisionmaking, timely and accurate information, greater opportunity to interact with and learn from customers, improved integration and coordination within the company, increased advantage over

rivals, and decreased requirement for paper supplies.

Chen and Yin (2010) on the other hand concentrated on the monetary benefits of ERP system. Their findings implied that economics benefits of ERP systems become visible within the twelve months following to its implementation and when compare to non-users of ERP system, those which implemented ERP had better operational performance.

Nevertheless, ERP systems exhibit disadvantages as well as mentioned advantages. Common disadvantages regarded are as networking and great storage requirements and training loads by Shehab et al. (2004). Disadvantages are generally suggested to stem from the integration of the company and application programs. Some components of software application process such as reorganisation and reengineering are also regarded as the major sources of the disadvantages for ERP systems.

Another disadvantage, high financial burden of the ERP systems implementation is emphasised by Woo (2007). The scholar noted that purchasing software licence is three to seven times less costly for customers compared to implementation of ERP related services. In fact, great capital investment and management time requirements are also suggested by Beheshti (2006). The scholar regarded an ERP system as time consuming and expensive due to those requirements. Cost of ERP systems is also suggested by Shehab et al. (2004) as a disadvantage of an ERP system as well as the requirement for training the personnel and privacy issues. They explain that due to the high cost of ERP systems and necessity for trained personnel it is quite challenging to implement ERP systems for small business enterprises efficiently.

Functionality of an ERP package is also a subject to be considered. If there is a difference between the functionality of an ERP package and the outcome that the company implementing the package expects from the functionality of the ERP package, then this is referred as ERP system misfit. Soh, Kien and Tay-Yap (2000) conducted a study in Asian companies in order to investigate misfits. Data, process and output are the three classes of misfits their study revealed. Output misfits are suggested to emerge when the information contained in the output as well as presentation style of the outputs of an ERP package do not meet the requirements of the company.

The success of the ERP also depends on the technology acceptance. Therefore, in the following part technology acceptance model will be explained

and the factors effecting user acceptance will be discussed.

#### The Technology Acceptance Model (TAM)

The model was created by Davis (1989) and Davis, Bagozzi and Warshaw (1989) to ascertain the behaviour of individuals while using technology and other associated modes. TAM specifically focuses on 'perceived ease of use' and 'perceived usefulness' (Hernandez, Jimenez & Martin, 2011). The former refers to the degree of effort, both physical as well as mental, that the users feel they have spent while employing a certain information system (Davis et al., 1989). 'Perceived usefulness' is the perception of the user of the time spent in doing a specific task by employing a specific information system where the system is seen to have raised the productivity, performance and effectiveness of the user (Davis et al., 1989).

According to TAM, a large proportion of the variance in voluntary usage behaviours of new ITs and behavioural intentions is constituted from two notions, perceive ease of use and perceived usefulness. Al-Gahtani et al. (2007) suggest that between 15% and 45% of the variance in the 'self-reported 'usage' and intention to use' is explained by the experimental validations of TAM.

#### Factors affecting user acceptance in ERP

Implementation and success of ERP projects are examined extensively by scholars. These studies offer key factors which shed light on user acceptance in ERP projects.

#### **User Attitude**

Fister Gale (2002) regards resistance for change as a main problem encountered in ERP projects. In spite of the fact that every member may not be pleased by the new project, for accomplishment of the ERP project, users are suggested to believe in the ERP project. Attitude change managements deal with the orientation of users with the system and provide them projection to support and believe the system. Marnewick and Labuschagne (2005) explain various elements for the accomplishment of the new system in terms of the people in the company. They state that people in the company should comprehend and like the new system, have confidence in the project team and contribute to the project for the success of the system.

#### **Perceived Usefulness**

The limitations for the belief of a person related to the benefit of utilising a new system for improvement of the job performance is defined as the perceived usefulness by Davis (1989). He also defined perceived ease of as the limitations for the belief of a person related to the ease of utilising a specific system. According to TAM, perceived usefulness of a system and a person's approach related to the system usage constitute the elements influencing decision for computer utilisation. In order to increase utilisation of new IT systems, construction of effective organisational interventions are regarded by Venkatesh and Davis (2000) as useful which would stem from the comprehension of the mentioned elements influencing user decisions.

#### **User Beliefs of Benefits and Drawbacks**

Approach towards an object is considered to be grounded on the beliefs related to the object. Similarly, opinions of users are created by the beliefs for the impact of a specific system on job performance. In addition, perceived use of the ERP system is suggested to be influenced by the beliefs in the benefits of the system utilisation. According to Amoako-Gyampah and Salam (2004), ERP systems also require user comprehension regarding to the implications of the user interface applications on their business. In the same way, the drawbacks of a system may also hinder ERP adoption because drawbacks may adversely affect user beliefs and therefore their acceptance of the new technology.

As stated earlier, ERP systems are different than traditional IT system due to its comprehensive nature in terms of components and functions. It was reported by Van Everdingen and Waarts (2003), Sheu, Chae and Yang (2004) that national culture also affects user acceptance of ERP and therefore influence its successful implementation. Influence of culture on IS and ERP adoption is examined in the following sections.

#### The Role of Culture on ERP Adoption

As mentioned before, failure in the implementation of ERP is rather common. In this context, Shehab et al. (2004) emphasised that majority of ERP models developed by the authors considers US or European industries, and this could be the reason for more incompatibilities in Asia and other parts of the world. In fact, there are significant differences between cultures.

For example, when applied to Arabian society the power distance cultural dimension scores high at 80 which indicates the existence of an accepted, justified, clear and well-defined social hierarchy (Hofstede, 2011) which is not required by most of the European and the US cultures.

In organisational terms hierarchy is seen to reflect an elementary inequality and the predominance of centralisation as subordinates expect to receive direction from an ideally benevolent yet autocratic management. Compared to other Arab nations Saudi Arabia has a highpower distance dimension score of 95 (Hofstede, 2011).

In terms of collectivism, Arabic society gets the score of 38. Scoring 38 means, compared to European and the US cultures, Arabic society is perceived as collectivist, which is apparent in the strong long-term commitment of individuals to social groups including immediate and extended family and connections. In a collectivist society loyalty is of paramount importance, taking precedence over almost all other societal rules and regulations (Hofstede, 2011).

Arabic collectivist culture provides a nurturing environment for development of strong relationships in which responsibility for all group members is taken. Shame and loss of honour are the results of offences in a collectivist society, while moral terms are applied to employer/worker relations where employment and promotion decisions also take into consideration the groups the employee belongs to rendering management a process of group management. With a score of 25, Saudi Arabian society is perceived as more collectivist compared to other Arabic nations (Hofstede, 2011).

Wider Arabic society scores 52 for the Masculinity/Femininity dimension which, in terms of the scale illustrates that Arabic society is masculine. Societies classified as masculine exhibit certain behavioural characteristics such as the general belief of living to work, the expectation that management is an assertive decision-maker, equity, competition and performance are emphasised and conflicts are resolved by way of confrontation (Hofstede, 2011). For this dimension Saudi Arabian society scores 60 indicating it is perceived as possessing a higher degree of masculinity compared to other Arabic nations (Hofstede, 2011).

For the uncertainty avoidance dimension, Arabic culture scores 68 which indicates a strong preference for avoidance of uncertainty. Rigid codes governing beliefs and conduct and a zero-tolerance approach to non-traditional concepts and behaviours are characteristic of societies with high uncertainty avoidance (Hofstede, 2011).

Despite these differences empirical studies focusing on the relation between national culture and ERP system are regarded as quite limited. One

of those researches was conducted by Sheu et al. (2004) who investigated various organisations in China, Taiwan, Europe and the US. The scholars observed significant influences of national culture on the implementation of ERP systems. The findings of Sheu et al. (2004) showed that accomplishment of ERP systems is considered as closely related to the training programme and influence of culture. In addition, cultural perceptions were also considered as an element which may affect the implementation of ERP systems.

Effect on national culture on ERP integration in mid-size companies in 10 Europe countries was investigated by Van Everdingen and Waarts (2003). They utilised survey approach based on the cultural theories of Hall (1976) and Hofstede (2001). Their results provided that national culture has strong influence on adoption rates of ERP. More specifically, Van Everdingen and Waarts (2003) found that uncertainty avoidance, masculinity and power distance elements of Hofstede's cultural theory negatively correlated with adoption of ERP adoption rate.

On the other hand, the scholars found significant and positive influence of individualism on ERP adoption rate. With regards to the influence of masculinity on ERP adoption, the scholars brought important empirical evidence which challenged the previous findings. In their investigation, Van Everdingen and Waarts (2003) assumed that high masculinity rating would positively influence the adoption of ERP system because higher masculinity rating means that members of that culture place high emphasis on ambition, achievement and motivation. Finding a negative correlation between ERP adoption and masculinity, according to Van Everdingen and Waarts (2003) was particularly related to the characteristics of ERP because the main feature of the system is bringing various business processes together, integrating them under one IT architecture and facilitating exchange of information not only internally but also with the partners and suppliers. To this end, Van Everdingen and Waarts (2003) argue that these features show similarity with the values demonstrated by cultures where feminist characteristics such as relationship, co-operation and mutual agreement are high.

#### Methodology

The ultimate objective of this study was to determine to what extent the culture of employees affects the acceptance and use of ERP systems in Schlumberger Inc.'s Saudi Arabia operations. Thus, the author preferred quantitative methods because the topic at hand involved measuring the influence of culture in numerical way. With regards to the utilisation of theories, the author employed deductive approach because determining the role of culture on acceptance of ERP systems required deriving variables from existing models developed for technology acceptance. In other words, the research carried out moved from general to particular.

The review of the literature shows that IT adoption depends on several factors and these factors determine the variation between individuals, organisations even nations. Factors related to IT system are well defined by TAM which suggests that perceptions of individuals with regards to ease of use of the information technology and its usefulness determine users' attitudes towards that technology which, in turn, affect individuals' behaviour towards utilisation of that information technology because of the strong influence of perceptions on intentions. Since ERP is an IT system, TAM can be employed in the explaining acceptance and use of ERP in organisations. However, owing to complex nature of the ERP system, this study included user flexibility which demonstrates adaptability of individuals to novelty and communication and training factors in determining acceptance and use of the system in the company.

In addition to perceptions and attitudes related factors, reviewed literature underlined the importance of national culture in adoption of technology and related systems since use of technology shows similarity with the use of social practices. This indicated that dimensions of cultures identified by Hofstede (1985, 2011) could explain acceptance and use of ERP within an organisation. In this context, this study investigates acceptance and use of ERP in the company in the context of following predictions:

- ✓ H1A: Perceptions of employees with regards to usefulness of ERP are positively and significantly influenced by perceived ease of use of ERP system.
- ✓ H2A: Perceived benefits of ERP system is positively and significantly related to perceptions of Schlumberger Inc.'s employees with regards to usefulness of the system.
- ✓ H3A: Attitudes towards ERP system is positively and significantly related to perceived ease of use of the system and flexibility of users.
- ✓ H4A: User flexibility positively and significantly influences usefulness of ERP system, enhances user opinions about the benefits of the system and positively and significantly influences

attitudes of individuals.

- ✓ H5A: Communicating and training employees significantly increases perceived ease of use and perceived usefulness of ERP system, enhances user opinions about benefits and creates positive attitudes towards the ERP system.
- ✓ H6A: Higher collectivistic values negatively and significantly influence user flexibility, perceived usefulness and perceived benefits and therefore creates negative attitudes towards acceptance and use of the system.
- ✓ H7A: Higher uncertainty avoidance negatively and significantly influences perceived usefulness of ERP system and adversely affects user attitudes towards the system.
- ✓ H8A: Higher power distance negatively and significantly reduces perceived ease of use of ERP system and perceived usefulness thus, adversely affects user attitudes towards the system.
- ✓ H9N: High collectivism and masculinity characteristics of employees do not have influence on acceptance and use of ERP system because these dimensions of culture are more likely effective in adoption of new technology by the decision makers not the employees.

To determine the hypothesis, the author employed questionnaires. Question items are outlined in the table 1.

In developing the measures for the questionnaire items, the author used both open and close-ended questions. In Part-1, the author used 10-point scale and attempted to identify the cultural dimensions of the participants. Question 1 in Part-2 was designed in the form of open-ended question because the author was unsure about the names of the departments in the examined company. Question 2 and 3 in Part-2 were designed in the form of close-ended questions with predetermined answers with given three and four options respectively. Question 4 in Part-2 was also designed in the form of close-ended question but its type was yes/no question. From Part-3 and onwards, the author used opinion statements with five-point Likert scale ranging from strongly agree to strongly disagree.

In terms of sampling, the author employed purposive sampling method since the main target of employees was Saudi Arabian. Thus, through using his acquaintances, the researcher selected the participants purposively according to their willingness to participate into the study. As a result of his efforts, the author collected the opinion and experience of 244 Saudi Arabian employees of Schlumberger Inc. work in Saudi Arabia.

#### **Data Analysis**

## **Profile of the Participating Employees**

The total of 244 employees were participated to this study. With regards to their position in the organisation, 53% of them were skilled or professional; 27% were undertaking administrative or supporting roles and 20% were supervisor or manager. With regards to the tenure, the majority of the participating employees had been working more than 10 years in Schlumberger Inc. (38%), 22% of the sample included those who had been working 5 to 9 years and 20% of the sample included employees working less than 5 years as well as those working who had been working 10 to 13 years respectfully. With regards to previous experience with ERP, 60% of the sampled employees stated that they previously worked in an ERP environment whereas for 40% of them had no prior experience with ERP system.

According to the findings, 18% of the participants work in inspection department. This is followed by distribution department and pipelines project department, each has 16% of the participants. 15% of the participants work in gas

plant department, 8% work in operations management, 6% maintenance work in department, 4% of the participants work in environmental department, research and development centre and network services department and 3% work in human resources.

As mentioned in methodology, first part in the questionnaire attempts to identify cultural dimensions related to participants. In achieving this, first five statements in the questionnaire designed to identify level of power distance, next 5 attempted to identify level of uncertainty avoidance, next five attempted to identify the level of masculinity/femininity and next four attempted to identify individualism/collectivism. In achieving the following chart, the researcher first calculated the average score for each individual regarding each cultural dimension (by summing all scores given by an individual in each dimension and dividing the total into number of questions in each dimension). Following to this, average score given to each dimension was computed by the researcher by summing all average scores and dividing the results for 244.



Bar Chart 1. Cultural Dimensions of Participating Employees

According to results, power distance and uncertainty avoidance are high among the participants and mostly show masculinity and collectivist behaviour.

# Participants' Opinion, Perceptions and Attitude for ERP System

## Ease of Use

According to results, the mean for "learning to operate ERP system was easy" was 2.52 with a

standard deviation of 0.847. The mean for "easy to get the ERP system to do what I want it to do" was 2.40 with a standard deviation of 0.744. Given mean values indicate that it was not easy for the employees of Schlumberger Inc. to learn to operate ERP system and working with the system in doing what they want it to do.

#### User Attitude

According to results, the mean for "the ERP

system provided access to more data" was 4.08 with a standard deviation of 1.141. The mean for "the ERP system made data analysis easier" was 3.78 with a standard deviation of 1.074. The mean for "the ERP system is better than the old system" was 3.35 with a standard deviation of 1.099. The mean for "the ERP system provided accurate information" was 3.32 with a standard deviation of 1.141. The mean for "the ERP system will provide integrated, timely and reliable information" was 3.02 with a standard deviation of 0.920. According to the findings, the common agreement of the participating employees was that the ERP system improved data accessing capability of the organisation. In the same way, the participants agreed that ERP system had enhanced functions which made data analysis easy however, according to the findings, doing analysis was easy to some extent. Interestingly, despite the positive opinions about the ERP system, the participating employees were unsure whether the ERP system is better than the old system. This could be related to their perceptions about ease use of the system. Similarly, the participating employees were not sure about the accuracy of the information provided by the ERP system. The findings are found to be reliable owing to the low standard deviation statistics because this shows that there is a very low dispersion among the given answers.

#### **User Opinion about Benefits of ERP**

According to results, the most important advantage of the ERP system is that it increased availability of information from field level up to the management level. This has the mean of 4.30 with a standard deviation of 0.823. The second most important benefit of the ERP system was that it improved responsibilities in relation to customers. This has the mean of 4.20 with a standard deviation of 0.648. This is followed by enhancing organisational flexibility which has the mean of 4.15 with a standard deviation of 0.770; providing an integrating working environment which has a mean of 4.12 with a standard deviation of 0.822; strengthening supply chain partnerships which has a mean of 4.00 with a standard deviation of 0.751. Enabling flexibility and facility to standardising process which has a mean of 3.92 with a standard deviation of 0.694; enabled automation which has a mean of 3.90 with a standard deviation of 1.057; enabling integration in applications in any departments which has a mean of 3.85 with a standard deviation of 0.736; improving decisionmaking capabilities which has a mean of 3.72 with a standard deviation of 1.219 and reducing project

completion time and cost which has a mean of 3.70 with a standard deviation of 0.723. As can be seen from the findings, participating employees not only aware of the benefits of ERP system, they experienced these benefits when fulfilling their tasks. As each of the aspect of the benefits had an average score higher than 3.50, one can argue that ERP system implemented in Schlumberger Inc. was effective in the eyes of its employees. Considering the low standard deviation and low dispersion among the given answers, the findings can be referred as reliable.

#### User Opinion about Drawbacks of ERP

According to results, "limitations posed by the high security" was the most agreed disadvantage of the ERP by the participating employees with a mean of 3.00 and a standard deviation of 0.877. The underlying reason for employees' opinions could be because of the possible adverse effects on the usability of the system. However, the findings suggest that they were not completely sure about this drawback. When the other drawbacks were examined, indecisiveness of the employees became more obvious. The most striking finding was that the participating employees gave decline in the efficiency and effectiveness of the organisation very low rating. The mean value of this item was 2.30 and a standard deviation of 1.159. This confirmed that the participating employees had positive attitude towards the ERP system because they did not believe that the new ERP system did not reduce the efficiency and effectiveness of Schlumberger Inc. The findings are found reliable owing to the low standard deviation values.

#### **User Flexibility**

According to results, the mean value for "comfortable with new technology or computer systems" was 4.20 with a standard deviation of 0.966. The mean value for "adapting well to change" was 4.15 with a standard deviation of 0.533. These findings imply that participating employees of Schlumberger Inc. were considered themselves flexible because they believed that they adapt well to change. As well as this, they generally feel comfortable with new technology or computer systems. The low standard deviation statistics confirm that the answers of the participants were consistent.

#### **Communication and Training**

According to results, the mean value for "understand the reason for replacing the old system with ERP system" was 4.02 with a standard

deviation of 0.891. The mean value for "Schlumberger Inc. provided support and training" was 3.45 with a standard deviation of 1.085. These findings imply that participating employees generally understand the reason for replacing the old system with ERP system. However, they were not totally agreed that they received the necessary support and training to perform their job effectively.

#### **Perceived Usefulness**

According to results, the mean for "I welcomed this change as a positive opportunity to learn new skills" was 4.25 with a standard deviation of 0.588. The mean for "Schlumberger Inc. has done a good job of implementing ERP system" was 3.95 with a standard deviation of 0.846. The mean for "using the ERP system increased my productivity" was 2.45 with a standard deviation of 0.783. These results imply that the majority of the participants welcomed this change as a positive opportunity to learn new skills. Thus, it was commonly agreed by the participating employees that Schlumberger Inc. has done a good job of implementing ERP system. However, when it came to the positive effects of ERP on their productivity, the low ratings indicating that the participating employees were not sure whether the ERP system had a positive impact on employees' productivity. The findings are reliable owing to the low standard deviations.

## **Hypotheses Testing**

#### **Correlation Matrix**

Table 2 presents the correlation coefficients of variables which are dimensions of culture identified by Hofstede - power distance, individualism/collectivism, masculinity/femininity, uncertainty avoidance - variables derived from TAM – perceived ease of use, perceived usefulness, user opinion/ benefits and drawbacks, attitudes – as well as user flexibility and communication and training.

The correlation analysis produced two significant results with regards to influence of power distance. According to the matrix given above, there was a positive and statistically significant correlation between power distance and ease of use variables (r=0.495, p<0.01). This implies that high centralised power leads to high perceived ease of use.

The second significant result was the correlation between power distance and perceived usefulness. As can be seen in the table above, there was a negative correlation between power distance and perceived usefulness (r=-0.412, p<0.01). As explained above, high power distance cultures do not give power to its employees in strategic decisions like adoption of ERP system. According to the findings, this, in turn, affects perceptions towards the usefulness of the new system. This explains why perceived usefulness of ERP declines in high power distance cultures.

The second column of the matrix gives the correlation coefficients related to individualism/collectivism aspect of culture. The results indicated that individualism/collectivism did not have significant influence on variables related to adapting new technology.

With regards to masculinity/femininity, the results indicated a positive correlation with uncertainty avoidance (r=0.300, p<0.05). This implies that high masculinity cultures have high uncertainty avoidance which means in cultures where individuals place high emphasis on achievement, tolerance for novelties and uncertainties caused by these novelties is low.

The impact of high uncertainty avoidance became on adoption of novelty became evident in the fourth column. According to the matrix above, there was a positive correlation between uncertainty avoidance and communication and training aspect of technology acceptance (r=0.400, p<0.01). This indicated that in cultures where there is high uncertainty avoidance, organisations place high importance on communicating and training its employees to avoid uncertainty with the adoption of novelty particularly an ERP system.

In other words, higher uncertainty avoidance increases communicating and training endeavours of employers to break uncertainty in users' mind to ease the acceptance and use of the new technology.

The fifth column presents correlations with ease of use variable. According to the matrix above, ease of use variable is positively and significantly correlated with attitude variable (r=0.349, p<0.05). This indicates that if employees' perceptions about easiness of a new system are high, this creates positive attitude towards the acceptance and use of this new system.

Interestingly, the results showed that there was a positive correlation between perceived ease of use and communication and training (r=0.492, p<0.01). In other words, higher the training and communication, higher the perceived ease of use.

The sixth column provided correlations related to attitude variable. According to the matrix shown above, users' attitude towards accepting and using new ERP system is positively influenced with perceived benefits of the new system (r=0.518,

p<0.01). Also, attitude of users is influenced by users' flexibility (r=0.500, p<0.01). This means higher the users' flexibility to adapt changes, better the attitude of individuals towards the acceptance and use of new system. The results also indicated that there was a positive and significant association between user attitude and communication and training endeavours of management (r=0.583, p<0.01). This means higher the communication and training endeavours of management, higher the attitude of individuals towards the acceptance and use of new system. Finally, the findings showed that there is a positive and significant association between user attitudes and perceived usefulness (r=0.347, p<0.05). This implies that higher the perceived usefulness higher the attitude of individuals towards the acceptance and use of new system.

With regards to users' opinion about benefits of ERP, the results shown in the seventh column indicated that there was a strong negative and statistically significant correlation between opinion about benefits of ERP and opinion about drawbacks of ERP (r=-0.615, p<0.01). This implies that higher the perceived benefits of ERP system lower the perceived drawbacks. According to the findings, there was a positive correlation between user flexibility and users' opinion about benefits of ERP system (r=0.489, p<0.01). This implies that higher the users' openness to change, higher the opinions about the benefits of the new system.

The matrix above also showed that there was a positive, moderately strong and statistically significant correlation between communication and training endeavours of management and users' opinion about benefits of ERP system (r=0.641, p<0.01). This implied how important top management commitment in successful implementation of ERP system in its acceptance and use by employees. Finally, the results showed that there was a positive and statistically significant correlation between users' opinion about benefits of ERP system and perceived usefulness (r=0.541, p<0.01). This implied a direct relationship between benefits and usefulness of a new system. In fact, if users have high opinion about the benefits of ERP system, their perceptions about its usefulness will also be high.

With regards to the correlations related to users' opinion about drawbacks of ERP system, the results shown in the matrix above suggested a negative, moderately strong and statistically significant correlation with communication and training endeavours of management (r=-0.548, p<0.01).

The findings related to user flexibility indicated that ensuring employees' acceptance of new system can be enhanced by communication and training efforts of management (r=0.308, p<0.05). User flexibility was also correlated positively and significantly with perceived usefulness of new system (r=0.368, p<0.05).

With regards to communication and training efforts, the result showed that these endeavours were positive, moderately strong and statistically significantly correlated with perceived usefulness (r=0.562, p<0.01). In the light of these findings, hypotheses formulated earlier can be tested.

In the first hypothesis, it was predicted that "perceptions of employees with regards to usefulness of ERP are positively and significantly influenced by perceived ease of use of ERP system". According to the results, the correlation between perceived ease of use and perceived usefulness was -0.015. As the direction of the correlation is opposite of the predicted relationship and as it is not statistically significant, H1A is not accepted.

In the second hypothesis, it was predicted that "perceived benefits of ERP system is positively and significantly related to perceptions of Schlumberger Inc.'s employees with regards to usefulness of the system". The results showed a positive and statistically significant correlation between these variables. Thus, H2A is accepted.

In the third hypothesis, it was predicted that "attitudes towards ERP system is positively and significantly related to perceived ease of use of the system and flexibility of users". The correlation analyses supported this prediction as attitudes and perceived ease of use were weak but positively and significantly associated however, user flexibility and attitudes were moderately strong, positively and significantly associated. Thus, H3A is accepted.

In the fourth hypothesis, it was predicted that "user flexibility positively and significantly influences usefulness of ERP system, enhances user opinions about the benefits of the system and positively and significantly influences attitudes of individuals". According to the correlation analyses, user flexibility was correlated with user opinions' about the benefits and perceived usefulness variables. These associations were positive and statistically significant, thus H4A is accepted.

In the fifth hypotheses, it was predicted that "communicating and training employees significantly increases perceived ease of use and perceived usefulness of ERP system, enhances user opinions about benefits and creates positive attitudes towards the ERP system". According to the correlation analyses, communication and training endeavours of top management positively and significantly associated with perceived ease of use, perceived usefulness, user opinion about benefits and attitude variables. Thus, H5A is accepted.

In the sixth hypothesis, it was predicted that "higher collectivistic values negatively and significantly influence user flexibility, perceived usefulness and perceived benefits and therefore creates negative attitudes towards acceptance and use of the system". According to the correlation analyses, high collectivism was negatively associated with user flexibility (r=-0.017), however, it was very weak but positively associated with perceived usefulness (r=0.017), user opinion about benefits (r=0.060) and user attitude (r=0.135). Due to insignificance and finding association in the opposite direction of the prediction, H6A is rejected.

In the seventh hypothesis, it was predicted that "higher uncertainty avoidance negatively and significantly influences perceived usefulness of ERP system and adversely affects user attitudes towards the system". According to the correlation analyses, the correlation between uncertainty avoidance and perceived usefulness as well as uncertainty avoidance and attitudes variables were weak but positive (r=0.156, r=0.081, respectively). As these associations were not significant and in the opposite direction than of prediction, H7A is rejected.

In the eighth hypothesis, it was predicted that "higher power distance negatively and significantly reduces perceived ease of use of ERP system and perceived usefulness thus, adversely affects user attitudes towards the system". According to the correlation results, high power distance was positively and significantly associated with perceived ease of use (r=0.495), but negatively and significantly associated with perceived usefulness (r=-0.412), as predicted. On the other hand, the association between power distance and attitude was weak, statistically insignificant and positive. Due to differences in predictions and actual results, H8A is rejected.

In the final hypothesis, it was predicted that "high collectivism and masculinity characteristics of employees do not have influence on acceptance and use of ERP system". According to the correlation analyses, neither high collectivism nor masculinity was significantly correlated with any variable which aid in acceptance and use of ERP. When formulating this hypothesis, it was believed that these dimensions of culture are more likely effective in adoption of new technology by the decision makers not the employees. Since no significant results were found, H9N is accepted because finding no significant results means no relationship between related variables.

#### Conclusion

### **Key Findings**

Ultimately, this research examined the role of national culture on acceptance and use of ERP systems. For the investigation of the topic, the author selected Schlumberger Inc.' Saudi Arabia operations. In conducting this research, the author sought to answer the research question of "In what way has the national culture of users affected acceptance and utilisation of ERP system in Schlumberger Inc.?"

The findings of this study showed that perceived ease of use of a new system is positively influenced by top management communication and training employees. Employees' adaptability to changes directly related to their perceptions as well as being acknowledged about the system through communication and training efforts. Developing well-designed training programmes and maintaining continuous communication between management and employees, it would be possible to increase successful implementation rate of ERP and to achieve higher employee acceptance and use. This suggested that communication and training endeavours change perceptions of users in favour of the new system and perceived drawbacks of ERP system was related to incompleteness of training efforts or lack of communication endeavours of top management.

With regards to the influence of national culture on acceptance and utilisation of ERP system, the findings indicated that high power distance positively influences perceived ease of use positively, however this negatively affects perceptions towards the usefulness of the new system. It was also found that high masculinity cultures have high uncertainty avoidance due to high importance placed on achievement and intolerance for uncertainties caused by novelties. The findings showed also that individualism/collectivism as well as masculinity/femininity did not have significant influence on accepting new technology.

In the light of these findings, it can be said that national culture significantly influences acceptance and utilisation of ERP systems. This study empirically proved that power distance and uncertainty avoidance were the key cultural dimensions which affect users' perceptions, opinions and attitudes towards ERP systems.

#### Contribution of this Research

This research made important contribution to the existing literature by providing empirical evidence on the acceptance and utilisation of ERP systems. The findings implied that perceived benefits positively and significantly affect perceptions about usefulness of the system. It was also found that attitudes towards ERP system are positively and significantly related to perceived ease of use of the system and flexibility of users.

In this context, this study found that user flexibility positively and significantly influences usefulness of ERP system, enhances user opinions about the benefits of the system and positively and significantly influences attitudes of individuals. Positive attitudes towards ERP system is related to communication and training endeavours of employers which increases perceived ease of use thanks to development of positive user opinions about the benefits of the new system. These findings implied that cultural factors, particularly power distance and uncertainty avoidance significantly affect acceptance and utilisation of ERP systems in high power distance and high uncertainty avoidance cultures.

These findings support the assertions of Sheu et al. (2004) which identified the importance of training programmes and national culture on ERP adoption. Different than this, the findings of this study partly challenged the existing empirical evidence provided by Van Everdingen and Waarts (2003) who showed negative influence of power uncertainty distance, avoidance and masculinity/femininity. The results of this study showed direct relationship between high uncertainty avoidance and intolerance to failure and therefore identified that higher emphasis is placed on communication between management and employees and their cultivation with regards to the utilisation of the new system which is the positive yet contrary evidence regarding the influence of culture on acceptance of ERP system. Other than this, the findings of this study challenged the results of Teng, Calhoun, Cheon, Raeburn and Wong (1999) who reported no influence culture on adoption of ERP.

The contribution of this research was not limited with the providing supporting or challenging evidence in relation to the existing literature. It is believed that this research expanded existing literature by showing the influential effects of national culture on the efforts of employers. It was evident from the findings that high centralised power led to high perceived ease of use which seemed an inevitable result in high power distance cultures because in these cultures, decisions are made by top management and employees are ordered to comply with these decisions.

Since employees at the lower end of the hierarchical structure were not involved with the decision to adopt ERP system, they were obliged to accept and use the new system even though they did not fully agree that the new system was useful. It is believed that this finding will bring a new dimension to the debate on the influence of national culture on adoption of ERP systems.

#### Limitations and Direction for Future Research

The findings of this study should be considered along with its limitations. The first limitation was the application of single case study where only one firm was investigated in determining the effect of culture on acceptance and use of ERP systems. Thus, it is difficult to generalise the findings to overall Saudi Arabian firms. The second limitation of this study was selection of respondents purposively. Use of non-probability sampling might have affected the significance of findings.

In the light of these limitations, it is suggested to carry out a further research in Arab countries and investigate user acceptance on multiple companies located in this region. It is believed that such study would identify the differences among countries which show similarity in cultural dimensions.

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Tab	ole	1.	Deve	lopment	of	Quest	ionnai	ire
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Ouestion/Statement	Part	Source
2	1. Cultural Dimensions	
012345	Power Distance	Hofstede (2001)
06 7 8 9 10		Hofstede (2001)
$011\ 12\ 13\ 14\ 15$	Masculinity	Hofstede (2001)
016 17 18 19	Collectivism	Hofstede (2001)
Question/Statement	2 User Characteristics	Holstede (2001)
	Department of participating respondent	Sob Van and Raman (1992)
	Department of participating respondent	Igharia and Nachman (1992)
Q2 03	Longth of time recoondant has been working in Schlumberger Inc.	Greated by the author
Q3	Drovious experience	laborio (1000)
Q4 Question/Statement		Igballa (1990)
Question/Statement	5. Ease of Use Easings of learning how to operate EPD system	Davis at al. $(1090)$
	Easiness of learning now to operate EKP system	Davis et al. (1969)
Q2	Easiness of working with ERP system	Taylor and Todd (1995)
Question/Statement	4. ERP Oser Attitude	Dell and Tarking data (1000)
UI 02	Accessing more data	Doll and Torkzaden (1988)
Q2	Easier data analysis	Doll and Torkzaden (1988)
Q3	Better than old system	Rashid, Hossain and Patrick (2002)
Q4	Accurate information	DeLone and McLean (1992)
Q5	Integrated, timely	DeLone and McLean (1992)
	and reliable information	
Question/Statement	5. User Opinion about Benefits of ERP	Source
Q6	Improved responsibilities in relation to customers	Wenrich and Ahmad (2009)
Q7	Strengthened supply chain partnerships	Davenport and Brooks (2004)
Q8	Enhanced organizational flexibility	Shang and Seddon (2002)
Q9	Improved decision-making capabilities	Shang and Seddon (2002)
Q10	Provide an integrating working environment	Saatcioglu (2009)
Q11	Enabled automation	Shang and Seddon (2002)
Q12	Increased availability of information from field level until the management level	Wenrich and Ahmad (2009)
Q13	Enabled integration in applications in any departments	Davenport and Brooks (2004)
Q14	Enabled flexibility and facility to standardize process	Wassenhove Van (2003)
Question/Statement	6. User Opinion about Drawbacks of ERP	Source
Q1	Causes problems in consistency, accuracy, representation of data	Hakkinen and Hilmola (2008)
Q2	Confusing and cumbersome due to difficulty in entering and extracting information	Hakkinen and Hilmola (2008)
Q3	Inconsistent with workload and skills of our organisation	Hakkinen and Hilmola (2008)
Q4	Limited usability due to high security measures	Hakkinen and Hilmola (2008)
Q5	Problematic due to too much or too less control	Hakkinen and Hilmola (2008)
Q6	Reduce effectiveness and efficiency	Akkermans, Bogerd, Yucesan and Wassenhove Van (2003)
07	Requires ways of operating that contravene organizational norms	Hakkinen and Hilmola (2008)
Question/Statement	7. User Flexibility	Source
01	Adapting change well	Davis (1986)
02	Being comfortable with new technology or computer systems	Davis (1986)
Question/Statement	8 Communication and Training	Source
01	Understanding why the old system is replaced with FRP	Pinto (1990)
02	Being provided support and training to use FRP	Venkatesh and Davis (2000)
Question/Statement	9 Parceivad Heafulnes	Source
	Using the FRD system increased productivity	Davis (1986)
02	Implementing FRP system is a good thing	Davis (1986)
42		Krumbholz Galliers Coulianos and
Q3	Welcoming this change as a positive opportunity	Maiden (2000)

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## Table 2. Correlation Matrix

		Power	Uncertainty	vcertaintv	Individualism/		e User		User	User	Communication	n/ Perceived
		Distance	Avoidance	Masculinity	Collectivism	of	Attitude	eOpinion/	Opinion/	Flexibility	Training	Usefulness
						Use		Benefits	Drawback	5		
	Pearson	1										
Power Distance	Correlation	l										
	Sig. (2-											
	Dearson											
Uncertainty	Correlation	114	1									
Avoidance	Sig. (2-	I										
	tailed)	.485										
	Pearson	4.60	420									
Maaaulinituu	Correlation	168	.139	1								
Masculinity	Sig. (2-	201	202									
	tailed)	.301	.393									
	Pearson	- 128	317*	082	1							
Individualism/	Correlation	.120	.517	.002	1							
Collectivism	Sig. (2-	.431	.046	.616								
	tailed)											
Ease of Use	Pearson	008	.165	.059	.034	1						
	Correlation	l										
	Sig. (2-	.959	.307	.719	.834							
	Dearson											
	Correlation	.096	184	038	.123	.448**	1					
Attitude	Sig. (2-	_										
	tailed)	.556	.255	.814	.450	.004						
	Pearson	121	120	026	247	200	F0F**					
User	Correlation	.131	.136	.026	.217	.300	.585	1				
Opinion/Benefits	Sig. (2-	122	103	872	178	060	000					
	tailed)	.422	.405	.075	.178	.000	.000					
	Pearson	.065	151	111	016	219	180	600**	1			
User	Correlation		.101						-			
Opinion/Drawbacks	s Sig. (2-	.689	.353	.496	.923	.175	.266	.000				
	tailed)											
	Pearson	.141	.174	.022	.063	.014	.393*	.457**	126	1		
User Flexibility												
	Jig. (2- tailed)	.386	.283	.895	.700	.934	.012	.003	.437			
	Pearson											
Communication/	Correlation	.105	.153	.043	.170	.565**	.614**	.633**	554**	.240	1	
Training	Sig. (2-											
0	tailed)	.517	.346	.791	.293	.000	.000	.000	.000	.136		
	Pearson	107	007	0.01	020	044	262*	F01**	100	207	F1 /**	1
Perceived	Correlation	.127	007	1001	.029	.044	.303	.531	199	.307	.514	T
Usefulness	Sig. (2-	431	964	618	860	720	021	000	245	054	001	
	tailed)	54		.010	.000	.709	.021	.000	.245	.004	.001	
			*. (	Correlation i	s significant at	the 0.	05 level	(2-tailed).				