Interdisciplinary Journal of Information, Knowledge, and Management

An Official Publication of the Informing Science Institute
InformingScience.org

IJIKM.org

Volume 13, 2018

SOCIO-TECHNICAL APPROACH, DECISION-MAKING ENVIRONMENT, AND SUSTAINABLE PERFORMANCE: ROLE OF ERP SYSTEMS

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ABSTRACT

Aim/Purpose	This explanatory study aimed to determine the mediating role of ERP in the relation between the effect of a socio-technical approach and decision-making environment, and firms' sustainable performance.
Background	Although earlier studies have discussed the critical success factors of the failure or success of an ERP system and the extent to which it achieves its desired objectives, the current study focused on the significant impact of socio-technical elements and decision-making environment on the success of the ERP system (i.e., sustainable performance). In addition, the lack of research on ERP as a mediator in the above relationship motivated this study to bridge the literature gap.
Methodology	The data was collected using questionnaires distributed to 233 randomly selected employees of three multinational companies (BP, LUKOIL, and Eni) operating in Iraq. The structural equation modeling was employed to test the hypothesized relationships.

Accepted by Editor Ewa Wanda Ziemba | Received: August 6, 2018 | Revised: October 12, November 2, November 6, November 10, 2018 | Accepted: November 11, 2018.
Cite as: AL-Abrrow, H; Alnoor, A., & Abdullah, H. (2018). Socio-technical approach, decision-making environment, and sustainable performance: Role of ERP systems. *Interdisciplinary Journal of Information, Knowledge, and Management*, *13,* 397-415. https://doi.org/10.28945/4149

Contribution	The study contributes to the literature by examining the mediating role of the ERP system in the relationship between socio-technical elements and the decision-making environment, as well as, the moderating role of organizational culture in the relationship between socio-technical elements and ERP systems.
Findings	The results showed that ERP is a significant mediator between the linkage of socio-technical elements and the decision-making environment while organizational culture has an insignificant moderating role in the relationship between socio-technical elements and ERP systems.
Recommendations for Practitioners	In a developing country like Iraq, there is a need to implement ERP to achieve better sustainable performance through change management and organizational development that ultimately work towards enhancing individual capabilities, knowledge, and training.
Recommendations for Researchers	The researchers are recommended to conduct an in-depth study of the phenomenon based on theoretical and empirical grounds, particularly in light of the relationship of socio-technical elements and decision-making environments.
Impact on Society	This study provides a reference for organizations with similar cultural backgrounds in using ERP systems to minimize pollution in Iraqi context.
Future Research	A more in-depth study can be performed using a bigger sample, which not only includes the oil industry but also the other industries.
Keywords	organizational culture; socio-technical approach; decision-making environment; ERP system; sustainable performance

INTRODUCTION

In mid-2009, Iraq signed an agreement with many multinational oil companies to sustainable performance and requesting to equally focus on the betterment of localities and environment instead of only concentrating on their own profit, after which, it issued licenses to multinational companies for oil and gas exploration and production. Consequently, in the current times, foreign companies operating in Iraq, within the oil industry particularly seek 'sustainability' as one of their prime objectives. However, prior to the signing of the agreement in 2009, there had not been much real investment in Iraq, especially in the oil sector. As the contracts with the oil companies have been cancelled by Iraq due to their failure to meet the environmental needs, it became necessary to improve their internal work for the purpose of achieving the external benefits for the society. Hence, this issue is predominantly important because sustainable performance provides these companies with a competitive advantage. To ensure sustainable performance, integration among various organizational components is of utmost importance (Y. Chen, Okudan, & Riley, 2008). Companies need to bring in information technology in all its operations (both internal and external) to better achieve integration and hence to sustain performance (Finney & Corbett, 2007). In this regard, the majority of the organizations around the globe have their own enterprise resource planning (ERP) system which facilitates the integration among different organizational units (Shehab, Sharp, Supramaniam, & Spedding, 2004).

In relation to the above, organizational culture is crucial for the success or failure of various organizational processes (Barney, 1986; Gordon & DiTomaso, 1992; Lund, 2003), the most important of which is organizational change process Organizational culture refers to shared meaning, interpretations, values, norms and basic assumptions leading people in a certain direction (Alvesson & Sveningsson, 2015). Needless to say, the success of a change process depends on whether the organizational culture is supportive to change or resists it (Smollan & Sayers, 2009; Alvesson & Sveningsson, 2015). To bring in an ERP system, companies have to go through a complete change process,

and organizational culture has to be supportive of such changes. The change process also requires the presence of a decision-making environment to facilitate it (Isik, 2010). Additionally, organizations must work to create an organizational culture compatible with the technological and social change in the environment. All this will help to evaluate the system implementation in terms of results achieved (Aliyu, Rogo, & Mahmood, 2015; Chow, 2012). This change process covers several aspects including, innovation, flexibility, adaptation, and new entrepreneurship (Sarros, Cooper, & Santora, 2008).

In the present study, an ERP system is considered as an information technology-based system, that assists change process in replacing old work processes (Appelbaum, 1997; Fuenfschilling & Truffer, 2016; Markard, Suter, & Ingold, 2016). Successful implementation and execution of this change will bring fruits to the organization (Bentley et al., 2016; Luna-Reyes, Zhang, Gil-García, & Cresswell, 2005). Therefore, attention to system precedents (i.e., socio-technical elements, decision-making environment, and configuration of organizational culture) will increase the likelihood of the success of an ERP system and the desired outcomes.

Although earlier studies have discussed the critical success factors in the failure or success of an ERP system and the extent to which it achieves its desired objectives (e.g., Al-Mashari, Al-Mudimigh, & Zairi, 2003; Fadelelmoula, 2018; Morris & Venkatesh, 2010; Sammon & Adam, 2002), the current study emphasizes on the impact of socio-technical elements and decision-making environment on the success of the ERP system (i.e., sustainable performance). Moreover, it is interesting to know that the long-term use of ERP does not only improve business processes but also improves overall firm's performance and thus top management and owners benefit from the long-term use of ERP system (Lečić & Kupusinac, 2013). The system requires non-traditional, risk-taking, innovative, and proactive decisions to change the traditional procedures and to ensure optimal performance (Al Dhaafri & Al Swidi, 2013). To capitalize on an ERP's system benefits, there must be a clear understanding of the purpose of having such a system. It also requires the ability and temperament of decision makers (Sammon & Adam, 2002). Furthermore, Al Dhaafri and Al Swidi (2013) found that the ERP system mediates the relationship between entrepreneurial orientation and organizational performance. Undoubtedly, a successful ERP system is important to achieving positive results for the organization (Sammon & Adam, 2002). However, ensuring the success of this system requires many organizational and social precedents (Al-Mashari et al., 2003). The totality of these precedents emphasizes the nature of the interaction between human and technology (Benders, Hoeken, Batenburg, & Schouteten, 2006; Kwahk & Ahn, 2010). As discussed in reference to previous studies, the focus is mainly placed on ERP as an independent variable that affects organizational results and there is still lack of research on ERP as a mediator; hence there is a need to bridge the gap so that the new knowledge can be added to the academic research. This is what the current study seeks to achieve.

In addition to the above, this study considers the moderating role of the configuration of organizational culture as precedent to the success (or failure) of an ERP system. The configuration of organizational culture depends on the dynamic relationship among organizational culture, strategy, structure, organizational processes, internal environment and the nature of interaction with the external environment (Dauber, Fink, & Yolles, 2012). This study takes into account the consequences of success (or failure) of an ERP system through sustainable performance as one of the expected outcomes of the successful implementation of the system. In other words, the study focuses on a model with an intermediary role of ERP system between its precedents (socio-technical elements and decision-making environment) and outcome (sustainable performance).

THEORY AND HYPOTHESES

CONFIGURATION MODEL OF ORGANIZATIONAL CULTURE

The term 'organizational culture' was introduced in the field of organizational studies during the 1970s and 1980s (Alvesson & Sveningsson, 2015; Dauber et al., 2012). Organizational culture is cru-

cial for the success or failure of various organizational processes (Barney, 1986; Gordon & DiTomaso, 1992; Lund, 2003), the most important of which is organizational change process. The success of a change process depends on whether the organizational culture is supportive to change or it resists change (Alvesson & Sveningsson, 2015; Latta, 2009; Smollan & Sayers, 2009).

Organizational culture refers to shared meaning, interpretations, values, norms and basic assumptions leading people in a certain direction (Alvesson & Sveningsson, 2015). A good organizational culture is characterized by its clarity to employees and its positive effects on their workplace identities and behaviors (O'Reilly, Chatman, & Caldwell, 1991). The configuration of organizational culture can be defined as "any multidimensional constellation of conceptually distinct characteristics that commonly occur together. Numerous dimensions of environments, industries, technologies, strategies, structures, cultures, ideologies, groups, members, processes, practices, beliefs, and outcomes have been said to cluster into configurations, archetypes, or gestalts" (Meyer, Tsui, & Hinings, 1993, p. 1175). On the other hand, Schein (1985) defined the configuration model of organizational culture as a dynamic phenomenon that surrounds us at all times, being constantly enacted and created by our interactions with others and shaped by leadership behavior. It is a set of structures, routines, rules, and norms that guides and limits behaviors. Based on Hatch and Cunliffe's (2006) and Schein's (1985) models of organizational culture, Dauber et al. (2012) developed another model of organizational culture that consists of interrelated components, which are aligned with the internal and external environment of the organization. The basic underlying assumptions of this model include organizational culture and identity, espoused values, organizational strategy, artifacts, and the relationship among organizational design, structure, process, organizational behavior, and performance.

Socio-Technical Approach

In recent times, continuous innovation and technological development have made 'organizational context' one of the major research domain for organizational scholars (Fisher et al., 2016). This has increased the importance of having a fit between social and technological environment called 'socio-technical approach' (Kling & Lamb, 1999). Socio-technical approach suggests that human and technological behavior is oriented in a coherent and interactive manner. It also proposes that any change in technological behavior (Mitra & Mishra, 2016) will also affect work-related social relationships, feelings, and attitudes along with its effects on the success or failure of new technological behavior (Dauber et al., 2012; Geels, 2004). Technological interventions(and developments) in the already existing organizational system is one of the most difficult tasks due to the fact that organizations are profoundly affected by technological advancements and require a flexible customized change model which aligns with a social network of the organization (Appelbaum, 1997).

The process of introducing technological change is complex and delicate due to the dynamic relationship between system components operating in a specific environment (Appelbaum, 1997; Markard et al., 2016). It requires a complete restructuration of already established socio-technical systems, hence a high degree of fit is required between system components and the environment to overcome the resistance to change process. The integration between the social system and the new technological system will lead to the better achievement of desired outcomes (Bentley et al., 2016; Luna-Reyes et al., 2005). This socio-technical integration is chief to sustainable performance (Fisher et al., 2016) and thus results in the introduction of new products, services, and business models (Fuenfschilling & Truffer, 2016; Markard et al., 2016).

Decision-Making Environment

Today's organizations are surrounded by an uncertain environment due to rapid technological changes. In these circumstances, managers have to make riskier decisions more often and more quickly than ever before (Daft, 2010; Lawrence, Robinson, & Eisner, 2001). Organizations are facing issues in coping with the rapidly changing environment. In this situation, managers need to make wise deci-

sions and to understand and overcome cognitive biases in decision making. This is possible where a decision-making environment is in place (Daft, 2010).

Accordingly, Westmacott (2001) defined the decision-making environment as a set of factors that determines the efficiency and effectiveness of a manager's decision-making ability (i.e., level of education, communication and cooperation, institutional and analytical capacity, and available financial resources and information) (Lawrence et al., 2001). It can also be defined as the totality of physical and social factors (both internal and external) to be directly considered while making a decision[s] (Isik, 2010; Talukder, Blackman, & Abdullah, 2014). Internal factors include people, functional units, and other organizational factors, while external factors refer to customers, suppliers, competitors, socio-political factors, and technological issues (Isik, 2010; Kuhn, Kuhn, & Villeval, 2017).

The decision-making environment requires a close interaction between the physical and socio-economic variables to have improved decision[s] (Lawrence et at., 2001; Westmacott, 2001). Decision-makers need to understand environment effect[s], social issues, nature of decision[s], and information processing needs as components of a decision-making environment (Westmacott, 2001; Zack, 2007). It is, therefore, necessary to pay attention to the environment and its components to achieve greater decision[s] efficiency[ies] (Kuhn et al., 2017: Talukder et al., 2014). A decision-making environment builds on the previous experiences of decision makers and their managerial ability to evaluate and implement alternate decision[s] (Talukder et al., 2014; Westmacott, 2001). The accuracy of opinions and the diversity of sources and backgrounds along with boldness [and ambiguity] in decision-making determines the success [or failure) of a decision-making environment (Hsu & Chen, 1996).

ERP Systems

The growing number of horror stories about failed or out-of-control projects should certainly alert managers about the enormous technical challenges of rolling out enterprise systems. These systems are profoundly complex pieces of software, and installing them requires a huge amount of money, time, and expertise (Davenport, 1998; Kwahk & Ahn, 2010; Nair, Reddy, & Samuel, 2011). It has been revealed that organizations are heavily investing to have ERP systems (Khairullah & Khairullah, 2013; Sammon & Adam, 2002). An ERP system is a comprehensive software package designed to integrate the complete range of business processes and functions in order to present a holistic view of the business as a single information and IT architecture (Clemmons & Simon, 2001; Al-Mashari, Al-Mudimigh, & Zairi, 2003; Nair, Reddy, & Samuel, 2011). ERP systems offer distinct advantages to companies in terms of improved decision-making process via the provision of appropriate and timely information (Al-Mashari et al., 2003; Shah, Bokhari, Hassan, Shah, & Shah, 2011). Adoption of an ERP system has become mandatory to deal with kinds of inventory and working capital related issues. Additionally, organizations need to have recent information about customers' requirements along with the ability to manage widespread suppliers as an integrated whole. All this can be achieved through an ERP system (I. J. Chen, 2001; Nair et al., 2011). Silva and Fulk (2012) further argued that a proper implementation of an ERP system can better deliver benefits like the development of cost reduction and a real-time access to business data, especially in the developing countries like Iraq. Hence, in order to successfully implement an ERP system in countries like Iraq, there is a need to be aware of how ERP system evolved as an technology along with its strengths and weaknesses and implementation challenges (Al-Mashari et al., 2003; Momoh, Roy, & Shehab, 2010).

Sustainable Performance

With ever-increasing environmental pollution, depletion of natural resource, and accompanying social problems, 'sustainability' has become a major concern for the world (Y. Chen et al., 2010; Ishak, Eze, & Ling, 2010). Generic corporate strategies of sustainable development do not work owing to different organizational scenarios, rather tailored-made strategies are required for organizations operating in a unique and different environment (Manz, Manz, Adams, & Shipper, 2011; Salzmann, Io-

nescu-Somers, & Steger, 2005). In recent times, organizations are more concerned about environment-related issues, such as rising costs associated with environmental damage, and increasing demand for investments in environment-friendly processes and products (Manz et al., 2011). This has also triggered stakeholders' pressure on organizations to devise and manage corporate activities for sustainable corporate performance (Gadenne, Mia, Sands, Winata, & Hooi, 2012; Ishak et al., 2010). There is the emergence of a debate on sustainable performance management and corporate social responsibility that aims at addressing the social, environmental, and economic aspects in general, and corporate sustainability management in particular (Schaltegger & Wagner, 2006; Sebhatu, 2008).

Sustainability performance management is thus a process through which managers ensure that organizational resources are obtained and used effectively and efficiently in order to achieve a firm's economic, social and environmental goals (Crutzen, 2011; Ishak et al., 2010). In recent times, companies must abide by the number of national and international standards related to the environment, human rights, and corporate governance. But sustainability means going beyond these legal compliances (Manz et al., 2011).

Moreover, the recent literature indicating the importance of environmental sustainable performance discussed the adoption of information and communication technologies for the improvement of sustainability. In this regard, Ziemba (2017) found that the technology quality, management, and information culture have a significant relationship with sustainability. Working on similar lines, Ziemba (2018) worked on sustainability information society index and discussed the importance of such indices. However, as far as Iraq is concerned Saeed, Ramli, and Saleh (2016) assessed sustainability practices in the energy sector of Iraq and found that Iraq suffers an unprecedented rise in the amount of the greenhouse gas emissions, and no governmental efforts are being taken to integrate sustainability practices within the sector.

Socio-Technical Approach, Decision-Making Environment, ERP System, and Sustainable Performance

Socio-technical elements are of great importance in the implementation of any technological system in a human-social environment because the success depends on these elements (Rao & Nayak, 2017; Shah et al., 2011). Research has witnessed that social and technological factors are most important to the success [or failure] of an ERP system (Benders et al., 2006; Kwahk & Ahn, 2010). The coordination among business units is extremely important to align technological and social system and bringing in a 'change' (Shah et al., 2011). Alignment between the technological system and social system affects perceptions, attitudes, and feelings of employees to make them receptive to change (Kwahk & Ahn, 2010). Therefore, the technological systems should be inspired by the components of the social system in order to ensure successful activation of a 'change' (Benders, Batenburg, Hoeken, & Schouteten, 2009), especially when ERP implementation requires collective and collaborative action (Benders et al., 2006). Also, communication between stakeholders before and during decisions of 'change' is very important (Shah et al., 2011). Thus, the debate between stakeholders will increase the perception and knowledge of those concerned about positive effects of 'change' and benefit from the 'change' through the implementation of a new ERP system (Kwahk & Ahn, 2010; Little, 2005). Therefore, this study hypothesizes that:

H_1: Socio-technical approach is positively related to an ERP system.

H_2: Decision-making environment is positively related to an ERP system.

Prior evidence suggests that decline in performance and productivity following ERP implementations is somewhat short-lived but after a lag of time ERP firms often emerge to higher productivity and performance in the long run (Nair et al., 2011; Sammon & Adam, 2002). Such lag-led re-*emergence* of performance gains are often a product of job redefinition, the establishment of new procedures, fine-tuning of the ERP software, and the taking charge of new streams of information created by the ERP system (Nicolaou & Bhattacharya, 2006). ERP is more than a tool for cost-cutting. It pro-

vides a rich source of information that allows firms to support a business strategy that pursues growth, innovation, and possibly even entrepreneurship (Clemmons & Simon, 2001). It provides access to customers and market data that allow a firm to investigate and evaluate external opportunities for growth and therefore increases sustainable performance (Motwani, 2016). Thus, one would expect a wide range of effects from an ERP system ranging from operational to strategic. It is important to note that changes in the organizational system[s] may not result in immediate success due to adjustment costs, learning, and other factors. Benefits of ERP systems require longitudinal review of organizational performance (Ahlawat & Punam, 2011; Njihia & Mwirigi, 2014). Research studies have documented the effects of decision-making environment on sustainable performance (Waas et al., 2014). There is a need to understand how harmony between the social environment and the new methodology is important to the successful implementation of new systems and sustainable performance (Smith, 2007). Alignment between social and technological systems encourages and increases sustainable organizational performance (Dwyer, 2011). Therefore, this study hypothesizes that:

H_3: ERP system is positively related to sustainable performance.

H_4: Socio-technical approach is positively related to sustainable performance.

H_5: Decisions making environment is positively related to sustainable performance.

Mediating Effects of ERP System

Achieving the benefits of an ERP system is conditional to some critical factors contributing to improving business performance (Al-Mashari et al., 2003). It is interesting to know that the long-term use of ERP does not only improve business processes but also improves the overall firm's performance and thus top management and owners benefit from such use (Lečić & Kupusinac, 2013). The system requires non-traditional, risk-taking, innovative, and proactive decisions to change the traditional procedures and to ensure optimal performance (Al Dhaafri & Al Swidi, 2013). To capitalize on an ERP system's benefits, there must be a clear understanding of the purpose of having such a system. It also requires the ability and temperament of decision makers (Sammon & Adam, 2002). Morris and Venkatesh (2010) found that an ERP system plays an important role between job characteristics and job satisfaction. Al Dhaafri and Al Swidi (2013) also found that the ERP system mediates the relationship between entrepreneurial orientation and organizational performance. This means that the success of an ERP system is dependent on the perception of those involved in running this system. This perception will determine the intentions towards the successful implementation of the ERP system to achieve better performance. This requires alignment and a good fit between the human and material factors. Therefore, this study hypothesizes that:

H_6: ERP system mediates the relationship between socio-technical elements and sustainable performance.

H_7: ERP system mediates the relationship between decision-making environment and sustainable performance.

Moderating Effects of Organizational Culture Configuration

The success of an ERP system requires the close interaction among system elements. It also requires creation of an organizational culture supportive to change process and facilitation of successful implementation of an ERP system (Shah et al., 2011). Therefore, when an ERP system is at odds with organizational culture, its implementation is prone to failure (Boersma & Kingma, 2005; Jones, Cline, & Ryan, 2006; Ke & Wei, 2008). Little (2005) argued that organizational culture affects the nature of complex interactions occurring in socio-technological systems. Organizational culture determines the social assimilation of an ERP system within the organization by influencing the motivations of individuals and groups involved (Boersma & Kingma, 2005). Many researchers have found that it is the difference in organizational culture that determines the success or failure of an ERP system, which ultimately affects performance and competitive advantage (Riaz, Sair, Shrafat, & Malik, 2014; Tang &

Cheung, 2009). Organizational culture also influences the socio-technical elements through the nature of interaction with technology, interaction with others through technology and job design and structure (Vatrapu, 2010). Therefore, this study hypothesizes that:

H_8: The configuration of organizational culture moderates the positive relationship between socio-technical elements and ERP system.

H_9: The configuration of organizational culture moderates the positive relationship between decision-making environment and ERP system.

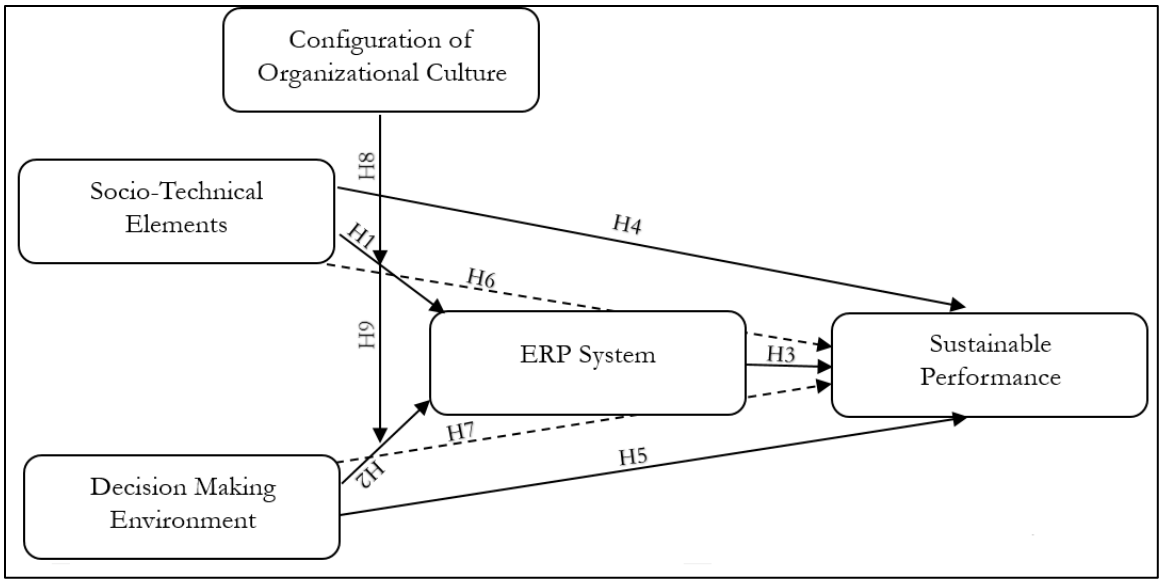

Figure 1: The proposed conceptual model (Ke & Wei, 2008)

METHODOLOGY

THE SAMPLE AND DATA COLLECTION

This study was carried out within three multinational companies operating in Iraq, namely, British Petroleum (BP), Lukoil, and Eni. Data was collected through questionnaire copies distributed to randomly selected 233 employees of these three companies out of total 600 employees. Initially, 250 questionnaires were distributed and 238 responses were received. Five responses were excluded for containing incomplete evidence so that the final sample was 233 individuals. According to structural equation modeling (SEM), a sample size of more than 200 cases is good enough for obtaining reliable results (Hair, Black, Babin, & Anderson, 2010). The survey was conducted during the first quarter of 2017 with the consent and cooperation of the human resources department of the companies. The sample included 180 (77.25%) males and 53 (22.75%) females. Also, the respondents worked in a wide variety of positions, including managers (20.9%), office administrators (25.8%), professionals (32.4%), and technical support (20.9%). The age of the respondents ranged from 21 to 66 years, with a mean age of 40.65 years, while their education levels are divided as follows: secondary (24.6%), diploma (30.4%), bachelor (34.8%), and Ph.D./master (10.2%). The questionnaire comprised of 102 items (for all five variables), measured on a five-point Likert scale that ranged from '1' (strongly disagreed) to '5' (strongly agreed). However for the achievement of generalizability of research findings and increased validity and consistency, a lengthy and detailed questionnaire is needed (Jain & Gupta, 2004).

Measurements of Variables

The configuration of organizational culture: This was measured on a scale developed by Schein (1985) and it consists of 3 dimensions and 21 items. Respectively, these are artifacts with 5 items (e.g., "*There are well-known stories in this firm about employees who have developed new and useful ideas*."), norms with 8 items (e.g., "*Striving to be successful with new ways of doing things is expected within this firm*."), and basic values with 8 items (e.g., "*We value success in this firm*.").

Socio-technical elements: Safarnia, Tajedini, and Mollahosseini's (2012) scale was used, which consists of four dimensions and 15 items. These are information sharing with 4 items (e.g., *"The ERP team members are well equipped to share knowledge."*), organizational culture with 4 items (e.g., *"The ERP system has helped us become more integrated and cohesive as an organization, overall and as workgroups/teams."*), process improvements with 4 items (e.g., *"The ERP teams feel a sense of self-governing characteristic, which enables them to integrate process improvements and/or streamline operations."*), and customer satisfaction with 3 items (e.g., *"Generally speaking, implementing the ERP system has increased customers satisfaction in my department."*).

Decision-making environment: Duncan's (1972) scale was used to measure the decision-making environment. It consists of 10 items comprising of 5 items for types of decisions made (e.g., *"The decisions I make require computational complexity and precision."*), and 5 items for information needed in making these decisions (e.g., *"Accuracy of information is high."*).

ERP System: For the ERP system Ifinedo's (2007) scale was used, which consists of five dimensions and 40 items. These are system quality with 11 items (e.g., "*Our ERP has accurate data*."), information quality with 8 items (e.g., "*Our ERP database contents is up-to-date*."), individual impact with 6 items (e.g., "Our ERP enhances individual creativity."), workgroup impact with 7 items (e.g., "*Our ERP helps to improve workers' participation in the organization*."), and organizational impact with 8 items (e.g., "*Our ERP reduces organizational costs*.").

Sustainable performance: We used Crutzen's (2011) scale in this regard. This consists of three dimensions and 16 items, which are environmental sustainability with 6 items (e.g., "*Provide further motivation for firms to implement environmental initiatives*."), economic sustainability with 3 items (e.g., "*Increase the selling price of the hulk*."), and social sustainability with 7 items (e.g., "*Corporate actions can be used to effect positive social change*.").

Data Analysis

Various statistical tools along with SPSS V. 22 and AMOS V.22 were used to analyze that data. Cronbach's Alpha was used to ensure reliability (internal consistency among items) and validity (model fitness), and Pearson's correlation was used to establish the correlation coefficient among variables. Path analysis was also performed to test the hypotheses of the model (Hayes, 2013).

RESULTS

Descriptive Statistics

Table 1 reflects that Cronbach's Alpha values for all five variables are greater than 0.70, which shows that there is internal consistency among variables (Pallant, 2011). Table 1 also shows the means, standard deviations, and correlations among the variables. There is a positive correlation between predictors (socio-technical elements, $p < .05$; decision-making environment, $p < .01$) and outcome (sustainable performance). Also, socio-technical elements and decision-making environment are positively correlated with the ERP system. Similarly, a positive and significant correlation ($p < .01$) exists between the ERP system and sustainable performance. We also found a positive correlation of configuration of organizational culture with socio-technical elements, decision-making environment, and the ERP system ($p < .01$).

Table 1: Descriptive statistics

	Mean	Std. Deviation	COC	STE	DME	ERP	SP
COC	3.37	.663	(.909)				
STE	3.30	.727	.662**	(.906)			
DME	3.20	.486	.583**	.542**	(.957)		
ERP	3.36	.607	.453**	.634**	.345**	(.911)	
SP	3.28	.757	.523**	.187*	.234**	.612**	(.911)

Note: N = 333. Alpha reliabilities appear in parentheses.
COC= configuration of organizational culture, STE= socio-technical elements, DME= decision-making environment, ERP= enterprise resource planning system, SP= sustainable performance
*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).

Assessing the Model Fit

Correlations were also computed to determine the reliability of different scales used for the measurement. Structural equation modeling was carried out using AMOS V. 22. We tested four models using maximum likelihood procedure. We also used two categories of indicators, which are absolute fit indices and incremental fit indices. The first category (Chi-square/*df* and RMSEA) illustrates general fit between theoretical model and the data, while second category (CFI, TLI, and NFI) is used to compare the tested model with the null model. The null model assumes that the variables in the model are mutually independent (Widaman & Thomson, 2003).

In the first model (A), we assumed that all the factors loaded on one latent factor. The fit indices show little support for the validity of this model (Table 2). The results of the first category of indicators show that there is no fit between the theoretical model and the data. CMIN/*df* value and RMSEA value far exceeded the accepted values (CMIN/*df* = less than 2 and RMSEA between .05-.08) (Hair et al., 2010). The results of the second category of indicators for the null model (CFI, TLI, and NFI) shows that the proportion of variance explained by the theoretical model is not much higher than the null model (i.e., lack of access to the values accepted for indicators, which is 0.90 (Widaman & Thomson, 2003).

In the second model (B), four independent variables (socio-technical elements, decision-making environment, the configuration of organizational culture, and ERP system) were loaded on the dependent variable (sustainable performance). The results showed an improvement in the values of the indicators but they were still not acceptable as compared to the model (A).

In the third model (C), three independent variables (socio-technical elements, decision-making environment, and configuration of organizational culture) were loaded on the dependent variable (sustainable performance) through one mediator (ERP system). Similar results were reported as in the previous case if the model is compared to the model (B).

In Table 2, the results in regard to the first and second category of indicators show that values of the indicators did not reach the acceptable values (as mentioned above). This indicates a mismatch between the theoretical model and the data. Additionally, the ratio of variance explained by the theoretical model is not more than the null model for the two models.

The fourth model (D) differs from the third model (C), where the configuration of organizational culture has been taken as a moderator. This achieves acceptable results for the indicators of the two categories (CMIN/*df*= 1.07, CFI= .98, TLI= .93, NFI= .96, RMSEA= .07). This means that this theoretical model fits with data obtained from the study sample. It also achieves a much larger variance explained ratio than the null model. These results, therefore, support the validity of this model.

Table 2: Assessing the models fit

Models	Chi-square (sig)	df	CMIN/df	CFI	TLI	NFI	RMSEA
A	155.45 (0.0001)	7	22.20	.46	.28	.45	.21
B	29.42 (0.0001)	4	7.35	.64	.49	.62	.16
C	6.22 (0.04)	2	3.11	.78	.67	.77	.13
D	2.15 (0.08)	2	1.07	.98	.93	.96	.07

Note: CMIN/*df*= minimum discrepancy, CFI = Comparative Fit Index, TLI = Tucker-Lewis Index, NFI = Normed Fit Index, RMSEA = root mean square error of approximation

Hypotheses Tests

AMOS was used to do the path analysis (Hayes, 2013) to test the hypotheses of moderation and mediation effects. The nine hypotheses tested are shown in Figure 2 and Table 3.

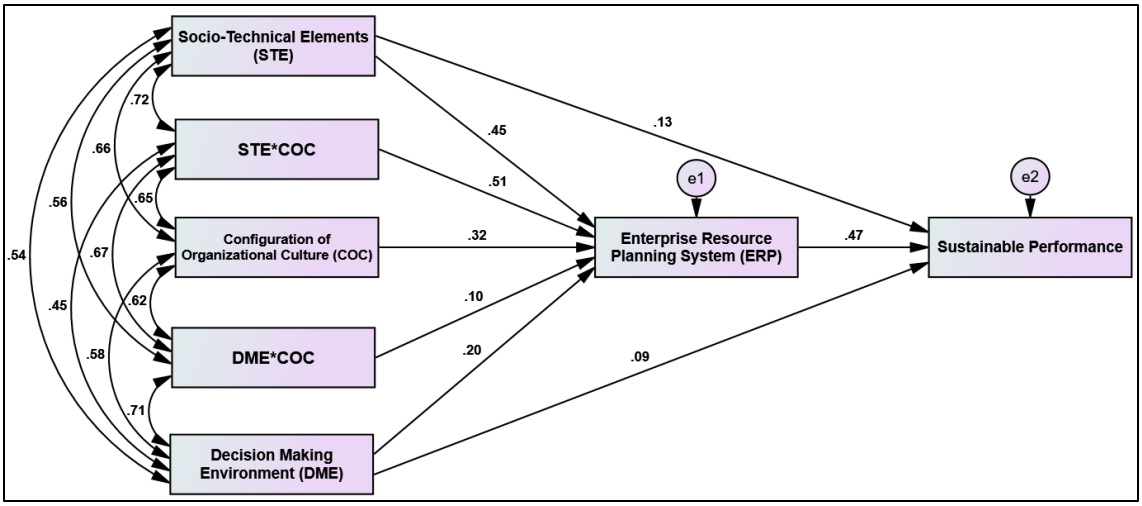

Figure 2: Testing hypotheses of the study

As shown in Table 3, all direct and indirect effects of hypotheses (H_1, H_3: $p < .01$ and H_2, H_5: $p < .05$) are accepted, except for H_4, which suggests that there is no direct effect of socio-technical elements on sustainable performance.

Sobel test for H_6 and H_7 shows that an ERP system fully mediates the relationship between socio-technical elements and sustainable performance ($p < .01$), and thus, H_4 is rejected. This means that socio-technical elements affect sustainable performance only through the ERP system. We also found a partial mediation role of the ERP system in the relationship between decision-making environment and sustainable performance ($p < .01$) and thus H_5 is accepted. This suggests that the decision-making environment has a direct effect on sustainable performance and an indirect effect in the presence of the ERP system. However, the estimate of indirect effect ($.095^{**}$: $p < .01$) is more significant and clear than the estimate of direct effect ($.092^{*}$: $p < .05$).

Table 3 also reports results in respect to moderation hypotheses (H_8, H_9). The results showed acceptance of H_8 (i.e., configuration of organizational culture works as a moderator between socio-technical elements and an ERP system) at ($p < .01$), while no support was found in case of H_9 (i.e., configuration of organizational culture does not moderate the relationship between decision-making environment and an ERP system).

Table 3: Hypotheses testing results

	Path					Estimate	S.E.	C.R.	P	Result
H1	STE		--->	ERP		.452	.043	12.767	***	Supported
H2	DME		--->	ERP		.202	.072	2.139	.025	Supported
H3	ERP		--->	SP		.472	.039	10.282	***	Supported
H4	STE		--->	SP		.131	.064	1.547	.091	Not Supported
H5	DME		--->	SP		.092	.032	2.562	.014	Supported
H6	STE	--->	ERP	--->	SP	.213	.026	Supported	***	Supported
H7	DME	--->	ERP	--->	SP	.095	.034	2.733	.006	Supported
H8	STE*COC		--->	ERP		.510	.069	5.926	***	Supported
H9	DME*COC		--->	ERP		.102	.047	1.872	.084	Not Supported

COC= configuration of organizational culture, STE= socio-technical elements, DME= decision-making environment, ERP= enterprise resource planning system, SP= sustainable performance

DISCUSSION

The present study is an attempt to understand the effects of human-technology interaction on sustainable performance in the presence of an ERP system. The study primarily considers the moderating role of the configuration of organizational culture in the relationship between socio-technical elements, decision- making environment, and ERP systems. The various results (as reported above) suggest that bringing in a new technological system will be of no use if organizations do not realize how the new system will affect the human-technology interaction to achieve desired outcomes. Sustainable performance is the prime concern for firms and bringing in new technology is essential to achieve this end. The expertise and opinion of senior management, also, count a lot towards the successful introduction of new technology.

In general, systems are designed to complete a specific job efficiently and effectively. However, this objective cannot be reached if the system operators have no desire to accept and work with the new system. Therefore, this study suggests that a consistent evaluation of the system is necessary to determine if the system succeeds [or not] (Benders et al., 2006; Kwahk & Ahn, 2010). The study favors that willingness of system operators is extremely important to the success of an ERP system because there is always 'resistance' to 'change' (Shah et al., 2011). New system implementation requires equal consideration be given to socio-technical elements (i.e., focusing on the human aspect in the same degree as the technological aspect). High quality, innovative, and proactive decisions must be made in a supportive decision-making environment (Al Dhaafri & Al Swidi,2013). All the pros and cons (both for organization and employees) must be properly considered while implementing an ERP system (Lečić & Kupusinac, 2013). This is necessary to defuse the threat of losing a job and other related benefits in the minds of employees due to the implementation of the new system. All this means that socio-technical elements, decision-making environment, and configuration of organizational culture are critical to the successful implementation of ERP system, which in turn will contribute to sustainable performance (Al-Mashari et al., 2003).

This study also affirms that organizational culture determines the degree of organizational flexibility and its reflection at the individual level towards change. Organizational culture may accept or resist change to a certain extent. Stated clearly, if the organization is willing to 'change' this will lead to successful new system implementation (Boersma & Kingma, 2005; Jones et al., 2006; Ke & Wei,

2008). The results of the study support the same argument (i.e., the important role of organizational culture in interacting with the precedents of successful implementation of the ERP system).

Organizational culture also determines how an organization interacts with other stakeholders. On the individual level, it determines how individuals interact with their environment and how they interact as a group within that environment (Little, 2005). This explains the nature of the interaction between organizational culture and decision-making environment as well as the nature of the interaction between organizational culture and the new technological system.

CONCLUSION

Enterprise Resource Planning system (ERP) is one of the most widely used systems in modern organizations and such system requires many factors for its success. The development and updating of the system[s] on an ongoing basis is necessary to ensure that the system achieves its desired goals. In this regard, sustainable performance in the most desired objective of an ERP system and that can be achieved through collaboration among the system components. Particularly, a close interaction between 'human factor' and 'technological factor' is of extreme importance in this regard. Precedents of new system implementation (i.e., socio-technical elements and decision-making environment) must be well thought out before thinking about adopting a new ERP system. Similarly, a close attention to the key and important components of an organizational culture will determine the success of a new ERP system (i.e., sustainable performance).

CONTRIBUTION

The study contributes to the current body of literature in several ways. First, it examined the ERP system as a mediating variable in the model, which has not been examined in such a way in earlier research. Second, this study also examined the role of organizational culture as a moderator. Since the study model has not been applied in the oil sectors in prior studies, the third contribution of the study is to take into account the oil sector, which plays an important role in the global economy. Lastly, this is a pioneering study that applied the model in the Iraqi context.

RECOMMENDATIONS

On the basis of the obtained results, this study makes some recommendations. First, there are a number of precedents that must be considered by managers while implementing an ERP system. There must be a gradual implementation of a new system to replace the old one, where a close interaction among the system operators is promoted and intensive awareness sessions and workshops are held before putting a system on the ground. There is a need to have a follow-up timetable for the implementation of an ERP system so as to discover and analyze the problems and errors that may occur and thus to take corrective measures. There must also be wide communication with concerned parties inside and outside the organization to achieve the best results of the system.

In a developing country like Iraq, there is the need to implement ERP to achieve better sustainable performance as the implementation of ERP is related to change management and organizational development, whose ultimate aim is to enhance individuals' capabilities, knowledge, and training. It is also recommended to Iraqi oil companies that a drastic change may destroy the change process hence the key to success for the organizations is to steadily move towards the improvement of processes which includes the organizational culture.

LIMITATIONS

It is acknowledged that this study has some limitations and so the findings should be interpreted carefully. First, this is a cross-sectional study and variables were measured at one time. Thus, there may be a need for attention to other reasons. However, we tried to obtain comprehensive responses from the sample owing to their long-term experiences. Hence, in the future, this aspect must be con-

sidered by designing longitudinal studies in order to achieve more accurate and quality results. The measures used in this study were of a perceptual nature that was converted to quantitative data through the use of a questionnaire. Therefore, in order to eliminate the potential bias in this type of studies, perceptual data can be obtained in the form of qualitative data to attain more reliable results.

FUTURE RESEARCH

Future studies should focus on studying and developing the system[s] to keep abreast of the technological changes taking place. In addition, the mentioned precedents of new system implementation can further be investigated so as to make organizational culture accommodative to technological changes. This can be done by intervening in organizational culture and modifying them and focusing on the psychological and social aspects of the individual and group level.

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