Enterprise Resource Planning Systems (ERP) and User Performance: A Literature Review

Ahed Abugabah
Griffith Business School, Griffith University, a.abugabah@griffith.edu.au

Louis Sanzogni
Griffith Business School, Griffith University, l.sanzogni@griffith.edu.au

Enterprise Resource Planning Systems (ERP) and User Performance: A Literature Review

Ahed Abugabah
Griffith Business School
Griffith University , Nathan
Brisbane, Australia
Email: a.abugabah@griffith.edu.au

Louis Sanzogni
Griffith Business School
Griffith University, Nathan
Brisbane, Australia
Email: l.sanzogni@griffith.edu.au

ABSTRACT

Organizations spend billions of dollars and countless hours implementing Enterprise Resources Planning systems (ERPs) to attain better performance. However, the failure rate of ERP implementation is very high, with subsequent research interests focussing mainly on understanding the failure factors. With the spotlight of prior research mainly focussed on success and failure factors other important aspects have not been given enough attention.

This paper starts from the proposition that users can evaluate the benefits of the ERP systems and users can judge whether or not ERPs provide reasonable payoff and outcomes for organizations. This premise is based on the view that the user creates the benefits through the accomplishment of tasks leading to the achievement of goals. The study consists of comprehensive literature review bringing to light previous investigations on the impacts of ERP on user performance and presents how ERP research utilises IS theory to investigate ERP in different settings.

Keywords: ERP systems, success factors, user performance

INTRODUCTION

The growth of ICT and Information Systems (IS) coupled with the needs for Innovation and Sustainability have increased the pace need for high quality and efficient performance in organizations (Al-Mashari 2003). In view of the fact that ISs have been described and recognized by modern organizations as offering a remarkable potential for improving performance (Kimaro and Nhampossa 2005: Arunthari, 2005).

ERP systems have been one of the most significant systems in recent times and play a large supporting role in most of the major industries including airlines, telecommunications, transport, education government, etc (Judith 2005: Mehlinger 2006; Garcıa-Sanchezand and Perez-Bernal 2007). These systems are implemented with the belief that they will lead to better performance (Eric et al. 2007) by facilitating organizational operations and supporting various organizational goals to achieve more efficiency and effectiveness. ERPs certainly help (in principle) address the problem of fragmentations of information or "Islands of information" in business organizations. However, debate still exists regarding the various contribution of the ERP systems to performance, especially at the user level, where the core values of IS are represented and the actual benefits and impacts are created.

Although ERPs are being used widely all around the world, they bring along many problems as well as benefits. Most of the implementations represent failures and/or inadequate adoption of ERPs. This signifies just one of the failure factors (Botta-Genoulaz and Millet 2006) and suggests that ERPs, their impact and outcomes should be investigated from different perspectives especially with a view to study how the human factor influences success and how users can improve ERPs performance significantly.

As stated in the abstract, a large amount of research has been conducted concerning ERPs failure factors (Hongnd Kim 2002; Jawahar 2002; Zhang et al. 2005).

As a result this study starts from the premise that only users can evaluate these benefits and can judge whether or not they raise reasonable payoffs and outcomes for organizations since the benefits come from the users who use the system to perform tasks and accomplish goals (Abugabah and Sanzogni 2009).

These issues lead to many critical questions whose core part centralizes the study's aim on whether or not the ERPs improve user performance and meet staff requirements. Hence, studying ERPs impacts on user performance is a significant way to assess the utility of these applications and how they contribute to performance efficiency and effectiveness.

The paper comprehensively reviews literature about the impacts of ERPs on user performance and how ERP research utilizes IS theory to investigate ERPs in different settings. The paper has two major sections: the first sections covers ERP research in general while the second section covers ERP system and user performance research.

LITERATURE REVIEW

Recently it has been claimed that as many as 60% to 80% percent of all ERP systems fail due to lack of meeting expected outcomes (Mehlinger 2006) or lack of performance improvement, with users expressing dissatisfaction with their performance.

In light of these facts and the large investment of resources committed to adopting or shifting to ERP system by organizations, researchers have a strong desire to explain the causes and the factors that lead to good performance with ERPs (Kositanurit et al. 2006), what factors influence implementation success, those responsible for failure and the reasons for the problems that occur with the implementation of ERP systems (Al-Mashari 2003; Jawahar 2002; Zhang et al. 2005).

Researchers have investigated many issues related to ERPs ranging from pre-implementation requirements to successfully implement ERP projects with minimum costs. More specifically, to date, lots of studies have been conducted about critical success factors of ERPs, their various implementation steps, related problems, conditions of success and reasons of failure (Basoglu et al. 2007; Botta-Genoulaz and Millet 2006; Botta-Genoulaz et al. 2005; Somers et al. 2000). Among these studies user adoption and system use also have been investigated (Gyampah 2004; Calisir and Calisir 2004). Within the streams of several previous studies user aspects have been mentioned as a crucial factor when studying IS, particularly in terms of ERP systems.

While a large number of previous studies looked for answers at the organizational level, many of these studies have neglected the user level and its aspects, which made this area a bit ambiguous and unclear. Studying user performance in ERP system will clarify the complexity of their relationship with users based on the assumption that users are the core element who create value through their interaction with ERPs.

Users are the central tool, which creates value and benefits from IS. In this paper users mean all ERP systems user including managers, administrative and ARE professionals. Paradoxically however, user aspects such as user's needs, user task's requirements and user issues in general have received little attention from researchers casting the domain in ambiguity, if one considers the long history of ERP failures being attributed to the lack of fit between information and user task (Kositanurit et al. 2006; Abugabah and Sanzogni 2009).

Some past studies have mentioned the importance of user aspects, such as user involvement, user training, user characteristic and user environment as important variables when studying ERP systems (Baroudi and Davis 1986; Mandal and Gunasekaran 2002; Yusuf et al. 2004; Zhang et al. 2005). It has been mentioned that individual performance is an essential indicator to organizational performance. Accordingly, the study engages user performance as a tool to evaluate the ERPs since ultimately organisational performance is based on individual performance (Kositanurit et al. 2006).

A major issue in previous studies, is their reliance on organizational level data to evaluate the impacts of IS on performance. This is contrary to what we propose, which is that user performance should be investigated first in order to assess the actual impacts of systems on performance. This is based on the premise that the user can only judge and evaluate if the system is beneficial and appropriate to his or her performance and if the system contributes to organizational performance.

In this light user performance assumes a critical role in the determination of the benefits and payoffs brought to the organisation through its investment in ERPs.

Interestingly, the conventional critique of ERP systems states the lack of fit between applications and the practices that they are expected to support. The lack of knowledge of perceived benefits of ERPs for users motivates this type of study aiming to enhance our knowledge in this area. In addition, organizations adopt ERPs and their applications to improve performance by improving the availability, clarity, integration and accuracy of

data and information, enhancing efficiency, and reducing performance errors (Van der Loo et al. 1995). It is interesting that organizations implement ERP systems with these expectations. Unfortunately, these plans do not come true most of the time (Basoglu et al. 2007).

Indeed, most research efforts have concentrated on implementation issues or critical factors or the benefits of ERP system, but all of these studies were at organizational level. To date little attention has been given to user performance in this area due to the complexity of the applications, the lack of comprehensive models and the focus of current models on semi-related parts of information systems. Some studies however, investigated ERPs and their users and/or mentioned critical factors to be considered in the study of ERP systems. Some of the most important studies have been discussed below:

A survey on the recent research literature on ERP systems (Botta-Genoulaz et al. 2005), stated that the research activity on ERP systems has shown an impressive development in the last few years, visible through a constant increase in the number of articles, special issues of journals or dedicated sessions in international conferences. The study classified previous ERPs studies in six major parts, but mainly concentrating on ERP implementation; ERP optimisation; management through ERP; the ERP software. None of the literature alluded to user performance studies further reinforcing the need to enrich this area of research.

Another recent survey Basoglu et al. (2007), provides a comprehensive review of the literature resulting in a taxonomy that may be used by other researchers in the field. The study also defines a framework for organizational adoption of ERP systems. The model consists of core Technology Acceptance Model (TAM) variables (perceived ease of use of ERP system and perceived usefulness), and common actors of an ERP project: technology, user, organization and project management. The study explains the importance of user and user aspects in ERPs when studying ERPs in general. In addition, there have been studies which consider ERPs project life cycle (Stone et al. 2006), lack of top management support, data accuracy, and user involvement (Zhang et al. 2005; Ifinedo and Nahar 2006).

Many factors that have been investigated in previous studies but most have been carried out at the organizational level, although some of them mentioned or investigated some of the user aspects such as user involvement, user training and education and user satisfaction (Al-Mashari 2003; Yusuf et al. 2004; Zhang et al. 2005).

IS studies have typically focused on the fit between specific organizational dimensions and IS, but these studies were not developed for ERP systems (Hong and Kim 2002; Stone et al. 2006; Ifinedo and Nahar 2006; Seddon 1997). However, taking lessons from other systems settings and applying previous models to ERP system seem an acceptable process in IS research.

The updated DeLone and McLean's model was extended by (Chiplunkar et al. 2003), to explore the concept of success models in ERP systems and to identify the factors contributing to high-quality ERP systems, the benefit of their use and the business value of ERP system from the end-user's view. Data from 204 ERP users was collected via questionnaires at three high-tech firms. The results indicated that system quality and information quality are very important variables that affect benefits of use. However, system quality dimensions play a more significant role than information quality in terms of ERP benefit of use and user satisfaction (Ramayah and Lo 2007). Igbaria and Tan (1997), complemented this view in their investigation relating to the quality, and the impact of ERP systems from the perspective of private sector organizations. They found that system quality and information quality are considered the two important dimensions in the assessment of ERP success.

McAfee (2002), investigated the impact of enterprise technology on operational performance. He found that performance had been significantly improved and the study confirmed the returns of the ERP implementation for individual and organizations. Demonstrating the benefits of ERP system is not easy because implementing these complex applications is time-consuming and needs a huge resource. The alignment of the standard ERP processes with the company's business processes has been, for a long time, considered a critical step of the implementation process, and thus holds the attention of many researchers (Davis 1989; Venkatesh 2000).

In a similar vein, Kositanurit et al. (2006) conducted a comparative study between ERP users and non ERP users in the USA and Thailand. The study tried to explore the most important factors that affect user performance in ERP system. The study made valuable contributions in this area and aimed to test a structured TTF model and user satisfaction to establish how these variables can predict individual performance and organizational performance. The study concluded that system quality and utilization are very important factors that affect individual performance when using ERP systems. Although her study could potentially contribute significant results in this area, many significant factors, such as information quality, user characteristics and usefulness which have proved to affect significantly on user performance in IS environment, were not included.

Thompson et al. (2006), looked at many factors to assess the success of ERPs. Their study indicated that some factors are more important than others. The study concluded that ''People'' (in every sense that the word implies) is the most important factor in terms of ERPs implementation success, followed by ''Data'', which is

consistent with the literature. ERPs implementation is therefore more about people than technology. In other words, the study indicated the importance of immediate and continued emphasis on people. This is perhaps consistent with an intuitive idea that all other factors such as data, process, management, and organization ultimately depend on people. Thus, users should be central in ERPs studies since value of these systems depend on users and how users employ ERPs to accomplish tasks and meet preset goals.

Goodhue and Thompson (1995), stated that end users involvement, training and support for users are critical factors for ERP system. Their study proposed that these variables with other variables shape a framework to evaluate ERP system. Roldan and Millan (2000), examined the impact of shared beliefs concerning the benefits of ERPs among executives and engineers. The findings support the notion that systems or technologies, which are perceived to be easy to use and understand, will be viewed as more useful from the end-user's perspective. In addition, perceived ease of use (PEU) was found to mediate partially the effects of shared beliefs concerning the impacts of the ERP system from the end-user's perspective.

Chang and Wang (2008), conducted a recent study to better understand ERP system adoption from user's perspective. The study proposed a conceptual model to analyse factors affecting the ERP system usage and it mentioned many important variables that affect system use such as the effects of social factors when using ERP applications. The results show that social factors are the most significant determinant affecting the ERP system usage. Other factors such as compatibility and near-term consequences, which basically determine the impacts of system on user performance based on IS literature review in general are also significant. Although the study has mentioned some important factors, the focus of the study was limited to those variables that affect system usage.

To summarize, ERP system and user performance area obviously undervalued and is an area that needs more empirical investigation and research in various environments. This approach would clarify the relationship between ERPs and users and provide practitioners and researchers with further valuable insights about this huge application and its users.

DISCUSSION

Although lagging behind other industries the use of ERPs has increased however, organizations have not fully embraced this potentially valuable resource. To realise the potential outcomes and benefits of ERP within organizations, research into user performance, system use and IS fit is required.

Overall, previous studies added valuable knowledge to the IS literature; they complement each other and evaluate different aspects of ERP systems. However, they still have some shortages in user aspects side.

This study suggests that these different aspects could help synthesize a single significant framework to enable comprehensive evaluation of the ERPs and user performance, and then more specific measures within the dimensions of each aspect can be identified to facilitate the study as illustrated in the current model (Fig 1). More specifically, most of the previous studies either had a theoretical focus or investigated implementation issues or evaluate implementation success in general. To the best of our knowledge, none of the previous studies has tried to identify factors that affect user performance from the user's perspective, or the impacts of these systems on user performance at the individual level.

In short previous studies have shaped many aspects of the knowledge base in this part of the IS field ranging from success factors, implementation process, challenges factors, organizational benefits and user acceptance, but nevertheless leaving a knowledge gap regarding user performance and ERP application, irrespective of some studies that tried to evaluate very specific group performance in different types of organizations (Amoako-Gyampah and Salam 2004).

This study argues that the combination of different evaluation variables and their subsequent classification into structured dimensions and factors can contribute to shape a comprehensive model which helps to fill an essential part of the knowledge gap, and represents a further step in the ongoing investigation of ERPs and their impact on user performance.

This research shifts the emphasis from just the technical aspect and brings human, organizational and technological aspects together. Thus the extent to which ERP systems fulfil their role in the target organizations will be better recognized and understood.

Previous studies on end user performance have relied almost exclusively on dispositional factors to predict end user performance such as the influence of attitudes, and rarely situational factors such as system use and system quality on end user performance. The absence of situational factors is a major limitation of previous research because situational factors are believed to affect user performance directly and indirectly by acting on other factors that in turn affect user performance (Judith 2005).

It is interesting to note that studies that investigated ERPs and user performance, examined user performance either as an indicator to organizational performance or as primary variable used to examine system usefulness, and/or evaluate the implementation issues (system success).

In short, none of the previous studies has shown the importance of the relationship between ERPs and user performance exclusively from the user's perspective. In addition, the benefits and impacts provided by ERP systems need a rigorous evaluation, most existing evaluation studies of ERP focus on technical issues or implementation processes, which do not provide an explanation about ERP effects. They do not even explain the working relationships of ERPs with specific users in particular settings. Thus, the omission, from a comprehensive model, of the mechanism for the evaluation of the impacts of ERPs on user performance is still as an inherent problem to be rectified.

In brief, demonstrating the benefits and the impacts of ERPs is becoming compulsory from both academic and practical perspectives, due to the effect on individual performance, the high costs of these applications and the effects on organizational outcomes (Klaus at al. 2003). Unlike other information systems, an ERP system is a huge package of applications designed for all organizational parts. This system serves as a backbone for all organizational departments such as marketing, sales, human resource etc, and thus investigating ERP system might be more complex than other systems. Furthermore, an ERP system is one of the largest IT projects that business organizations apply. For example it is the largest IT project employed in higher education institutions world wide. In addition, an ERP system is costly and requires a large amount of resources to be implemented (Abugabah and Sansogni 2009).

PREVIOUS MODELS

Although previous models have shed some light on the links between information systems and user performance, they necessitated the need for more comprehensive view of IS and performance. Particularly, TAM has been criticized because of the lack of task concentration and even the elaborateness of focus on utilization of IS as a voluntary. However, utilization means for many users more a function of how jobs are designed than the quality of the IS.

D & M's model has been criticized and modified by many researchers to overcome some weakness or to adapt with various types of IS environments. It focuses more on satisfaction and factors that lead to user satisfaction, while ignored technology and task factors

Similarly, TTF suggests some constructs that are relevant to investigation. However, TTF does not answer the question of what aspects of IS lead to the highest levels of user performance (Mandal and Gunasekaran 2002).

To overcome these weaknesses, this model integrates the three models to produce a new synthesized model which has more comprehensive view of the most important factors that affect user performance. In general, previous studies stated the necessary of integrating these models to synthesize new comprehensive one which might be useful for different situations and serve several purposes at the same time (Dishaw et al. 2002; Zhang at al. 2005).

In conclusion, previous models offer valuable contributions to understanding of IS impacts. However each one tells only part of the story (Wu and Wang 2007). Thus, it became obvious that, for practical reasons, the factors had to be grouped into a model in a way that would facilitate analysis of IS use impacts on performance. This suggests that significant factors are not included in the models. We conclude that TAM is a useful model, but has to be integrated into a broader one which would include variables related to both human and social change processes, and to the adoption of the innovation model.

STUDY MODEL

In last two decades IS researchers have concentrated their efforts in developing and testing models that could help in predicting system use, system success and user aspects. Consequently, a number of models for studying IS utilization and the impacts on end users in have developed (Dishaw et al. 2002). The most commonly used models are, the Technology Acceptance Model (TAM), the Task-Technology Fit model (TTF), and DeLone & McLean model (D&M). We explored the similarities and differences among these models with a goal of developing a combined model with more explanatory power to better understand IS impacts on end user performance.

Davis (1989), introduced (TAM), which postulates that information technology impacts on user performance are determined by its perceived usefulness and perceived ease of use (Yusuf et al. 2004). The idea being that, external variables such as personal features, system features support and training can affect behaviour, which in turn affects system use and user performance (Wixom and Todd 2005).

Over two decades researchers have replicated, extended, and used TAM with some of its aspects still remaining unclear such as systems impact on user aspects. In contrast, other studies added a new dimension to the pot and validated/compared many models in the study of IS and user performance. These studies composed a new model combining TAM and TPB. The results obtained from investigations indicated that the decomposed model performed slightly better than individual models.

On the other hand, Dishaw and Strong (1999), model concentrates on the system quality, information quality and system use with user performance. Eventually, previous studies that applied D&M's model could achieve valuable contributions to the understanding of IS performance impacts and provide a scheme for classifying the different measures to interpret the linkages between IS and individual performance (Seddon1997; Somers et al. 2000; Sun et al. 2005).

Later on Gyampah (2004), tried to bring a new contribution to this field by introducing TTF model which supports the argument that when there is a fit between user task and the feature of the IS, benefits of the system tend to be high and user performance will be high and vis versa (Kositanurit 2003; Mandal and Gunasekaran 2002). Eventually, TAM and TTF overlap in a significant way and they could provide a coherent model if they are integrated, such that model could be even stronger model than either standing alone (Zhang et al. 2005; Dishaw et al. 2002). On the other hand D & M's model and TAM are interrelated. That is to say, TAM investigates the possible effects of EU and PU of the system and how they in turn can affect user performance D&M model specifies the software quality and outputs factors of the system or/ and application itself that create the usefulness of the system, which in turn affects user performance as well as ease of use. Hence, the study model has been synthesized according to these models to provide a more comprehensive tool that helps evaluate ERP system on user performance as illustrated in figure (1) below.
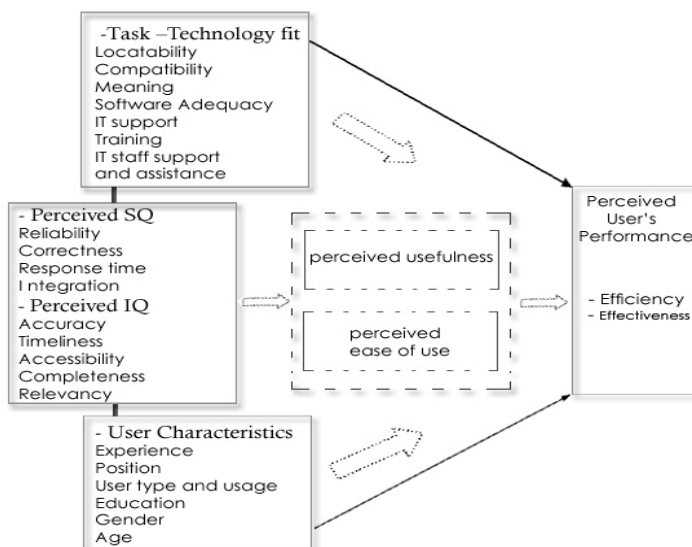

Figure (1) the proposed model

JUSTIFICATIONS OF THE STUDY MODEL

Extending TAM, TTF with D&M models provides profound explanation and holds much promise to reach better understanding for the variance of factors that affect user performance than any of these models alone.

The difficulty in measuring actual performance led many prior studies to use multiple perspectives and theories to reach more accurate and rigor results (Roldan and Millan 2000). The study argument is starting with a common agreement between many researchers (Dishaw et al. (2002), indicating that TAM and TTF overlap in a significant way and they could provide a coherent model if they are integrated, such that model could be an even stronger model than either standing alone. Namely, TAM focuses on perceived usefulness and ease of use and their effects on user performance.

While TTF model focuses on the ability of IT to offer a suitable functionality that matches the user's tasks needs .On the other hand D&M model and TAM interrelated to each other, that is to say that TAM investigates the possible effects of perceived usefulness (PU) and perceived ease of use (PEU) of the system and how they in turn can affect user performance D&M model specifies the software quality and outputs factors of the system or/ and application itself that create the usefulness of the system which in turn affects user performance as well

as ease of use of the system .In brief the current study model consolidates three model that have been validated separately in IS literature and adding some new constructs which also have been investigated in previous researches.

Previous studies examined above models separately, no study has yet theoretically and empirically compared or contrasted these three models simultaneously. Therefore, the current model opens up the paths across the avenues of TTF, TAM and D&M antecedents which were viewed separately as distinct parts, with no linkages among them. However, there are theoretical reasons and empirical support for the existence of linkages across these constructs (Umble et al. 2003).

An integration of TAM, TTF and D&M model will be useful in understanding IS impacts in a broader variety of circumstances, which is extremely important for academics, organizations, and users. Thus, the current model might help understand the TAM antecedents, and understand how to provide IS, that is perceived to be useful and easy to use (Eric et al. 2007). TTF model directly affects utilization of technology which is a major contribution of TTF, since TAM focuses on the technology more than the ability of the technology to support users as they perform their tasks, which is the core focus of the TTF model. That is, by integrating the two models it is possible to reach a more comprehensive view on the IS and user contemporaneously.

TAM only indirectly considers how the IS supports the user's task through the PU and EU (Eric et al. 2007). Additionally, personal characteristics were linked as control variables to examine the dynamic effects of these variables which have not received enough concentration in the previous research. Furthermore, helps identify major areas of SQ, IQ and TTF with the use of a given application that affects their employee's performance.

CONCLUSION

Organizations spend huge amounts in adopting and implementing IS applications. Investigating the impact of these applications on individuals' performance and productivity is a strong desire for academics and organizations. There are a large number of Information systems evaluation frameworks investigating different aspects and issues of these systems at both organizational and individual levels. Although authors have identified some main aspects and relationships in this area however, the literature lacks an examination of the consequences and the previous efforts so far have restricted their focus to the determinants of acceptance and user satisfaction (Nandhakumar at al. 2003).

The failure rate of ERP implementation is very high (Chien and Tsaur, 2007). Among other obstacles, technical problems, critical factors including top management support, training and people obstacles have been cited as major barriers (Botta-Genoulaz and Millet 2006). Hence, academicians started to be interested in ERP systems, especially in their failure factors, in last decade (Basoglu at al. 2007). As a result the previous work concentrated extensively on those factors that critically affect ERP implementation and contribute to system success.

That is, these facts and factors attracted the previous research in ERP system area while user factors still to be examined yet. To further understand the ERP impacts, this research attempts to evaluate actual impacts of ERP system on its user performance by using a well-established theoretical framework starting from the proportion that information systems cannot by itself affect the productivity but the main efficiency factor lies in the way people use these technologies (Botta-Genoulaz at al. 2007).

Previous efforts have identified some main aspects and relationships in this area however, the literature lacks an examination of the consequences and the previous efforts so far have restricted their focus to the determinants of acceptance and user satisfaction. The lack of a conceptual framework and integrated model has motivated this study (Abugabah and Sanzogni 2009).

While other factors such as IT training, IT budget etc are important when evaluate IS impacts, system's users and their aspects such as user characteristics, are important factors in creating benefits from these technologies, which should be given substantial attention to understand the ERP technologies and how these technologies could improve performance. However, there is a lack of empirically supported research on ERP system and user performance issues. This absence is the main motivation factor to evaluate the impacts of ERP on user performance starting from the user point which is the first unit in these organizations and on with a strong belief that system user is an important factor and lack of care about users of the system will lead to a disaster Basoglu at al. 2007).

This paper has identified some important issues.: The nature of the previous studies and what they could achieve such as proved IS impacts on performance and identify the main aspects of the relationship between IS and performance. Furthermore, a comprehensive view about the main factors that probably affect user

performance in ERP environment. Explained why the focus of the research should be moved from technical perspective to human (user) and organizational and technological perspectives contemporaneously.

FUTURE DIRECTIONS

Prior research has focused exclusively on dispositional and demographic factors to predict end user performance. Therefore, more research effort focusing on user performance, needs and exceptions seems desirable, which might help bring new essential contributions to this field

More specifically, most of the previous studies either have more theoretical concentration or investigating the implementation issues such as user acceptance, or evaluate the success implementation of the ERP in general. Our suggestion is to collect the most important factors that affect user performance from user perspective, or the impacts of these systems on user performance at the individual level.

This study suggests that the combination of different evaluation variables and their subsequent classification into structured dimensions and factors can help shape a comprehensive model. This helps better understand ERP benefits for both users and organizations. In other words, these different aspects could help synthesize a single significant framework to evaluate ERP system and user performance. A as result, more research effort could be conducted to evaluate user needs, characteristics and their subsequent and impacts on performance aspects.

REFERENCES

Al-Mashari , M. 2003 "Enterprise resource planning (ERP) systems: a research agenda." Industrial *Management & Data Systems* 103(1/2): 7-22.

Abugabah, A. and Sanzogni, L. 2009 "The impact of Information Systems on User Performance: A critical review and theoretical model" Proc. International Conference on Information Systems (ICIS), World Academy of Science, Engineering and Technology (57), pp. 809-819.

Amoako-Gyampah, K. and Salam, A. 2004. "An extension of the technology acceptance model in an ERP implementation environment." *Information and Management* 41(6), pp 731 – 745.

Arunthari, S. 2005. "*Information Technology adoption by companies in Thailand* : A study of Enterprise Resources planning System Usage. Information System, . NSW Australia, University of Wollongong. Doctorate thesis.

Baroudi, J and Davis, G. 1986. "An empirical study of the impact of user involvement on system usage and information satisfaction, *Communications of the ACM* (29), pp. 232–238.

Basoglu, N., T. Daim and Kerimoglu,O. 2007. "Organizational adoption of enterprise resource planning systems: A conceptual framework." Journal *of High Technology Management Research* 18: 73-97.

Botta-Genoulaz, V. and P. Millet. 2006. "An investigation into the use of ERP systems in the service sector." *International Journal of Production Economics* 99 (1), pp 202-221.

Botta-Genoulaz, V., P. Millet and Grobot, B 2005. "A survey on the recent research literature on ERP systems." *Computers in Industry* 56(6), pp 510-522.

Calisir, F. and F. Calisir 2004. "The relation of interface usability characteristics, perceived usefulness and perceived ease of use to end -user satisfaction with enterprise resource planning systems." *Computer in Human Behavior* (20), pp 505-515.

Chan, M., W. Cheung, Cheng, C and Yeung, J 2008. "Understanding ERP system adoption from the user's perspective." *International Journal of Production Economics* 113(2): 928-942.

Chang, H. and Wang C. 2008. "An investigation of user communication behavior in computer mediated environments" *Computers in Human Behavior (* 24), pp 2336-2356.

Chien, S. and Tsaur, S. 2007. "Investigating the success of ERP systems: Case studies in three Taiwanese high-tech industries." *Computers in Industry* 58(8), pp 783-793.

Chiplunkar, C., Deshmukh S. and Chattopadhyay, R. 2003. "Application of principles of event related open systems to business process reengineering." *Computers & Industrial Engineering* (45), pp 347-374.

Davis, F. 1989. "Perceived usefulness, perceived ease of use, and user acceptance of information technology." *Management Information System Quarterly* (13) ,Sep, pp 318-340.

Delone, W. and McLean, E. 1992. "Information systems success: the quest for the dependent variable" *Information systems research* **3**(1), pp 60-95.

Dishaw, M.T. and Strong, D.M. 1999. Extending the Technology Acceptance Model with Task-Technology Fit Constructs, *Information and Management* (36:1), pp. 9-21.

Dishaw, T., D. Strong and Bandy, B. 2002. "Extending the task technology fit model with self efficacy constructs" Eighth Americas Conference on Information Systems. USA: pp 1021-1027.

Eric, W, Ngai, Chuck, C and Law, H. 2007. "An investigation of the relationships between organizational factors, business process improvement, and ERP success: Benchmarking: ." An *International Journal* 14(3), pp 287-406.

Garcıa-Sanchez, N. and Perez-Bernal, L. 2007. "Determination of Critical Success Factors in Implementing an ERP System: A Field Study in Mexican Enterprises." *Information Technology for Development* 13(3), pp 293-309.

Goodhue, D and Thompson, R 995. "Task-technology fit and individual performance." MIS Quarterly 19(2), pp 213-233.

Gyampah, K. 2004. "ERP implementation factors: A comparison of managerial and end-user perspectives." *Business Process Management Journal* 10(2), pp 98-109.

Hong, K. and Kim, Y. 2002. "The critical success factors for ERP implementation: an organizational fit perspective." *Information & Management* (40), pp 25-40).

Ifinedo, P. and Nahar, N. 2006. "Quality Impact and Success of ERP Systems: A Study Involving Some Firms in the Nordic-Baltic Region." *Journal of Information Technology Impact* 6(1), pp 19-46.

Igbaria, M. and Tan M. 1997. "The consequences of information technology acceptance on subsequent individual performance." *Information & Management* (32), pp 113-121.

Jawahar, I. 2002. "The influence of dispositional factors and situational constraints on end user performance: a replication and extension." *Journal of End User Computing* 13.2 (April-June 2001 14(4), pp 17-20.

Judith, P. 2005. "Good Enough! IT Investment and Business Process Performance in Higher *Education ECAR*, key findings." 2005.

Kimaro, H. C. and Nhampossa, J. L 2005. Analyzing the problem of unsustainable Health Information Systems in Less-Developed Economies: Case studies from Tanzania and Mozambique. *Information Technology for Development*; 11(3), pp 273-298

Klaus, T., Gyires, T. and Wen, J. 2003." The use of Web-based information systems for non-work activities: An empirical study. *Human Systems Management* (22), pp 105–114.

Kositanurit, B. 2003. "An exploration of factors that impact individual performance in an ERP environment" PhD thesis, University of Virginia, Virginia, USA.

Kositanurit, B, Ngwenyama, O and Osei-Bryson, K. 2006."An exploration of factors that impact individual performance in an ERP environment: an analysis using multiple analytical techniques". *European Journal of Information Systems*. (15), pp 556–568.

Mandal P, Gunasekaran A. 2002. "Application of SAP R/3 in On-line Inventory Control", *International Journal of Production Economics*, (75), pp 47-55.

McAfee, A. 2002. "The impact of Enterprise technology adoption on operational performance: an empirical investigation." *Production and Operations Management* 11(1), pp 33-53.

Mehlinger, L. 2006." Indicators of Successful Enterprise Technology Implementations in Higher Education Business Morgan state Morgan state University. PhD thesis.

Nandhakumar, J. Rossi, M. Talvinen, J. 2003. "Planning for 'drift'? Implementation process of enterprise resource planning systems, in: 36th Annual Hawaii International Conference on System Sciences (HICSS'03), Big Island, Hawaii, January 06– 09, 2003.

Ramayah, T. and Lo. M. 2007. "Impact of shared beliefs on "perceived usefulness" and "ease of use" in the implementation of an enterprise resource planning system." *Management Research News* 30(6), pp 420-431.

Roldan, J. and Millan. A. 2000. "Analysis of the information systems success dimensions interdependency BIT World 2000 Conference Proceedings.

Seddon, P. 1997. "A Respecification and Extension of the DeLone and McLean Model of IS Success." *Information Systems Research* 8(3), pp 240-253.

Somers, T, Nelson, K and Regowsky, A. 2000, "Enterprise resource planning (ERP) for the next millennium: development of an integrative framework and implications for research", Proceedings of the 6th Americas Conference on Information Systems (AMCIS), Long Beach, CA, 10-13 August, pp.998-1004.

Stone, R, Good, D and Eveleth, B. 2006. "The impact of information technology on individual and firm marketing performance." Behaviour & Information Technology 26(6), pp 465 – 482

Sun, A., Yazdani, A. and Overend, J. " (2005). "Achievement assessment for enterprise resource planning (ERP) system implementations based on critical success factors." *Int. J. Production Economics* (98), pp 189-203.

Thompson, R., Compeau, D. and Higgins, C 2006. "Intentions to Use Information Technologies: An Integrative Model." *Journal of Organizational and End User Computing* 18(3), pp 3-25.

Umble, E., Haft, R and Umble, M. 2003. "Enterprise resource planning: Implementation procedures and critical success factors " *European Journal of Operational Research* (146), pp 241-257.

Van der Loo, R., Gennip E., Bakker, Hasman, A and Rutten, R 1995. "Evaluation of automated information systems in health care: An approach to classify evaluative studies." Computer Methods and Programs in Biomedicine (48), pp 45-52.

Venkatesh, V. 2000. "Determinants of Perceived Ease of Use: Integrating Control, Intrinsic Motivation, and Emotion into the Technology Acceptance Model." Information Systems Research **11**(4), pp 342-365.

Wixom, B. and Todd, P. 2005. "A theoretical integration of user satisfaction and technology acceptance." *Information Systems Research* 16(1), pp 85-102.

Wu, J. and Wang, Y. 2007. "Measuring ERP success: The key-users'viewpoint of the ERP to produce a viable IS in the organization." *Computers in Human Behavior* 23(3), pp 1582-1592.

Yusuf, A., Gunasekaran, A and Abthorpe, M 2004. "Enterprise information systems project implementation A case study of ERP in Rolls-Royce." *International Journal of Production Economics* (87), 251-266.

Zhang, Z., Lee, M, Huang, P, Zhang, L, and Huang, X. 2005. "A framework of ERP systems implementation success in China: An empirical study." *International Journal of Production Economics(* 98), pp 56-80.

COPYRIGHT