Enterprise Resource Planning (ERP) Systems and User Performance (UP)

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Abstract

World of Information Technology (IT) is improving with the widespread innovation and Enterprise Resource Planning (ERP) systems are one of them. At the user level, the debate regarding contribution of ERP systems to performance still exists, because users utilize these systems and assess the actual benefits and its impact on them. With prior research mainly focuses on success and failure factors and other technical aspects, therefore, this paper aims to shed light on the ERP systems literature regarding its impact on user performance by reviewing the relevant studies. The study will enable the researcher to understand the state of art about the role of users in terms of performance with the proposition that users can evaluate the benefits of these systems in the organisations where ERP systems are already implemented or in the stage of implementation. Lastly, the study provides limitations and suggestion for future research.

Keywords: Enterprise Resource Planning (ERP) Systems, User Performance (UP), Review, ERP Success

Introduction

Enterprise Resource Planning (ERP) systems are business management systems, comprising of a set of comprehensive software designed to integrate and manage all business functions within an organization, these set include applications for human resources, financial and accounting, sales and distribution, project management, material management, supply chain management (SCM), quality management (Shehab, Sharp, Supramaniam, & Spedding, 2004). Similarly, the main theme of ERP system is the centralization of information through the centralized database. ERP systems are Information System (IS) software modules sharing a central database and information is flown between them, which

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contain functionalities for sales and marketing, development and product design, field service, production, inventory control, distribution, process design, management, and procurement industrial facilities management, quality, manufacturing, human resource, finance and accounting, and information services (Upadhyay & Dan, 2008; Xu, Yu, Lim, & Hock, 2010).

ERP systems are designed with the quest to improve productivity by enhancing an organization's ability while generating accurate and timely information across the enterprise and all its supply chain. The successful ERP systems implementation can lead to lower inventories, reduce product development cycle, improve customer service, increase efficiency (productivity), improve profitability and improve effectiveness through better customer services (Beheshti & Beheshti, 2010). Keeping in view the benefits and functionalities of these systems, business organizations are investing in information systems to improve performance (Ifinedo, Rapp, Ifinedo, & Sundberg, 2010) and turning to ERP systems to deal with changing environment and overcome limitations of legacy systems (Poon & Yu, 2010).

ERP system implementation has led to better performance (Chung, Hua Tan, Lenny Koh, Law, & Ngai, 2007). These systems brought enormous benefits to organizations such as increased productivity, improve access to accurate and timely information, enhance work flow, reduce reliance on paper, knowledge sharing, tight control, (Bhamangol, Nandavadekar, & Khilari, 2011), as well as automate business processes by coordinating and integrating the information across departments (Monk, 2009). And these benefits are clear evidence; that's why larger organizations with large amount of data are attracted to these systems.

Despite the enormous advantages associated with ERP systems, organizations tend to avoid it, due to the complex implementation process and higher failure rate. As pointed out by Umar, Khan, Agha, and Abbas (2016), ERP project faced either complete failure or partial failure. The completion of IT and IS projects is a key challenge due to the uncertainties pertaining to technological complexities (Xu, Zhang, & Barkhi, 2010). In contrast to the growth of ERP systems , it is claimed that implementation of these systems failed with higher rate estimated to be 60 -90 percent (Ahmad, Haleem, & Ali Syed, 2014; Al-Shamlan & Al-Mudimigh, 2011)and inability exists to understand the promised advantages while not meeting the high hopes and expectations from ERP systems implementation (Carton, Adam, & Sammon, 2008; Dixit & Prakash, 2011).

With the ever-increasing development of technology and its integration into lives of both the private and professional people, a question still remains open regarding its acceptance or rejection (Tsai, Shaw, Fan, Liu, Lee, & Chen, 2011). In the past, millions of dollars are invested on information technology (IT), like ERP systems, to seek improvement in employee's performance or effectiveness, productivity in the workplace (Beheshti & Beheshti, 2010) or gain competitive advantage (Johansson & Newman, 2010). However, these benefits cannot be realised unless individual workers within these organisations use IT adequately and appropriately for performing their organisational tasks (Sun & Bhattacherjee, 2011).

Thus, the objective of this paper is to shed light on the ERP systems literature regarding its impact on user performance by reviewing the relevant studies. The study will enable the researcher to understand the state of art about the role of users in terms of performance with the preposition that users can evaluate the benefits of these systems in the organisations where ERP systems are already implemented or in the stage of implementation.

Literature Review

Enterprise Resource Planning (ERP) Systems

The term ERP abbreviated from "Enterprise Resource Planning", was introduced by the Gartner Group in the early 1990s (Arif, Kulonda, Proctor, & Williams, 2004) and represent computer and software systems that combine and integrate all related processes of the enterprise, and serve users for the management of all functions within the enterprise (Swartz & Orgill, 2001) .

Researchers referred ERP systems as enterprise system (ES), enterprise resource management (Cobarsí, Bernardo, & Coenders), and business system respectively (Davenport, 1998, 2000). Klaus, Rosemann, and Gable (2000) conceptualized ERP System as comprehensive packaged software solutions of Information System (IS) designed to integrate all business processes and work to present a complete outlook of the business from a singular IT and information architecture (Klaus *et al.*, 2000). Davenport (1998) also described ERP an information strategy that merge all information within an organization and create a comprehensive information infrastructure involving all organizational units and functions. Marnewick and Labuschagne (2005) clarified that ERP system is more than just a product or software and they further conceptualized ERP into four components. The first component is software component (Finance, Human Resources, Supply Chain Management, Supplier Relationship Management, Customer Relationship Management, Business Intelligence), which is the visible

part to users and seen as ERP product. The second component is process flow, which deals with the information flow among modules within ERP system. Third is customer mind-set, that define the influence of ERP system on users, team, and organization. And the final component is change management, this component deals with the adoptability of ERP system implementation within the organization, that are user attitude, project changes, business process changes, system changes. Similarly, number of authors echoed the concept of ERP systems, which is summarised in table 1.

Table 1: Summary of ERP concepts

Concept / Definition	Author (s)
ERP system is a business management system comprises of set of software that integrate and manage all business functions within organization	(Zornada & Velkavrh, 2005)
Enterprise Resource Planning systems are integrated and complex innovations	(Grabski, Leech, & Schmidt, 2011; Umble, Haft, & Umble, 2003)
ERP are comprehensive information system that support the information needs of all the business functions, in real time, including human resources, finance, marketing, operations, customer information, sales and supply chain	(Seng Woo, 2007)
ERP is generally termed as a system that automate key business functions through integration and support decision making accordingly	(Razmi, Sangari, & Ghodsi, 2009)
A set of business modules or applications, that links organization's units like humane resource, finance, manufacture, accounting into one single integrated system providing a platform for flow of information across all units of the business with the use of internet as medium.	(Beheshti, 2006)
ERP systems are configurable information system packages, which are design to integrate business functions.	(Wu & Wang, 2006)
ERP system are set of software designed to integrate all business functions within organization.	(Shehab *et al.*, 2004)
ERP is an integrated system where a unique database provide flow for information continuously and consistently for the entire company.	(Wadate, 2014)
ERP system is a customizable enterprise wide packages able to integrate all organization's functions to single system with a common database.	(Cardoso, Bostrom, & Sheth, 2004)

ERP systems are business software packages which integrate all needed information of the organization and efficiently and enables them to use resources effectively and efficiently (human resources, financial, material etc.)	(Fui-Hoon Nah, Lee-Shang Lau, & Kuang, 2001)
A packaged business software that automate and integrate the business processes of an organization, manage a common database across enterprise and access information in real time environment.	(Marnewick & Labuschagne, 2005)

User Performance (UP)

Literature illustrates that various studies are conducted to identify critical factors affecting ERP system implementation success in post-implementation phase are focusing on industrial surveys, individual cases studies and covered other research issues. Up to now, a few studies focuses on evaluating performance in ERP system's implementation phase. (Shen, Chen, & Wang, 2016).

Huang and Yasuda (2016) conducted a survey to investigate ERP research phases and aspects in recent years. The study divide found literature in three phases: pre-implementation, implementation and post-implementation. By examining the data, the implementation has lesser attention that pre-implementation and implementation phase. Further, in the post-implementation phase the topics under discussions with more attention are: Critical success / failure factors, Real benefits, Business process reengineering, ERP selection criteria, ERP impact, change management, implementation strategy and system/organization performance evaluation at organization level and user satisfaction with less attention. However, none of the studies focuses on user performance with ERP context, thus making this area worth to explore.

Likewise, another literature survey based on ERP lifecycle was presented by Elkhani, Soltani, and Nazir Ahmad (2014). The authors used ERP lifecycle framework, structured in phases: ERP adoption decision, ERP acquisition, implementation, use and maintenance, evolution and retirement phase to create an information bank of the published articles. All the collected articles according to the set criteria were summaries and reviewed in order to contribute to improve the performance of an organization by achieving its strategic goals. The study shows that the concentration remains on the subjects related to the implementation phase of the ERP lifecycle and the other areas such as post-implementation phase have been forgotten.

In ERP context users are ERP individuals who use ERP application for daily work, have some knowledge about how system works, and also are knowledgeable about other ERP users (Liu, Feng,

Hu, & Huang, 2011). In the implementation of ERP systems, users play a vital role to evaluate the impact on these systems on their performance (Peslak & Boyle, 2012) and the degree of the system usage directly affects recognized benefits of the implemented system (Tai, Wang, & Chang, 2014). ERP users can influence the success or failure of the ERP system (Koch, 2011) and the question of the ERP system's value to them has been a key concerns in many organizations (Ramdani, 2012). Despite of a considerable literature on ERP systems, still there is a need to investigate the success of ERP systems from the perspective of end users (Kwak, Park, Chung, & Ghosh, 2012).

Performance can be conceptualized in various dimensions (Koopmans, Bernaards, Hildebrandt, Schaufeli, de Vet Henrica, & van der Beek, 2011; Qureshi, Zaman, & Shah, 2010; Yasir, Imran, & Irshad, 2013) and usually performance relates to effectiveness and productivity is highly important for individuals and organization as a whole (Sonnentag & Frese, 2002; Yusoff, Imran, Qureshi, & Kazi, 2016). Galy and Sauceda (2014) used econometric analysis, to examine post-implementation managerial practices of ERP systems and their relationship with financial performance. The study proposed a cause-and-effect model to analyse financial performance related factors empirically such as net sales, net income, earning, return on assets and return on investment. The result revealed that information sharing between departments affects return on investment, return of assets and net income. The study further concluded to forecast which managerial practices are suitable for successful ERP implementation at the organization level.

In the project management context, Abu-Hussein, Abu-Hussein, Hyassat, Hyassat, Sweis, Sweis, Alawneh, Alawneh, Al-Debei, and Al-Debei (2016) investigated ERP project's performance using project management factors that are effecting these projects. Four project management areas such as the human resource management, the communication management, the risk management and the time management. The findings focused on the importance of effective communication to improve trust between employees leading to exchange of information needed for ERP implementation success. Similarly, in organizational context Law and Ngai (2007), conducted an empirical study to pinpoint the ERP adoption success, their results showed positive relationships between the perceptions of ERP success and perceived organizational performance and improved business processes.

Chang, Cheung, Cheng, and Yeung (2008) conducted a study to better understand ERP system adoption from the user's perspective. The study proposed a conceptual model to analyse factors such as social

factors, compatibility and near- term consequences and their effect on ERP usage. The results showed that social factors were the most significant determinant affecting the ERP system usage; however, the focus of the study was limited to those factors that affect system usage and end user involvement is critical in implementation.

Sun, Bhattacherjee, and Ma (2009) examined the role of several ERP factors, namely work compatibility, usefulness, ease of use, behaviour and intention to use, based on ERP user's performance and how these factors contribute in shaping ERP usage. The study demonstrated that these factors were found to be significant for user's performance, showing a significant effect on organizational outcomes. The result also proved the usefulness of integrating several IS models, including the IS success model and TAM model, to investigate ERP systems, as current IS models individually were criticized for being overly simplistic.

In the higher education context, Althonayan and Papazafeiropoulou (2013) evaluated impact of ERP systems in higher education with respect to stakeholder's performance. They propose a research model comprising of the factors from three models: Task Technology Fit (TTF), DeLone and Mclean's (D&M) IS success model, and End User Computing Satisfaction (EUCS) Model. Factors related to impact were gathered from DeLone and Mclean, considered as one half measure and the factors related to quality the other half measure were assembled from TTF and EUCS. The study concluded that system quality: flexibility, compatibility, right data, currency, ease of use, timeliness and service quality: tangibility, reliability, responsiveness, and assurance have impact on stakeholders'' performance, encouraging further research on integration of IS models to evaluate the performance at the user level.

Similarly, Abugabah, Sanzogni, and Alfarraj (2015) made an effort to evaluate the impact of the information system on the performance of users by proposing a model comprising of the variables from Delone & McLean Information System (IS) Success model, Technology Acceptance Model (TAM) and Task Technology Fit (TTS). Their study found impact of quality factors information quality, system quality along with user characteristics factors on their performance, but the study lacks the inclusion of important factors of service quality and user satisfaction for a comprehensive evaluation. Likewise, Ali and Younes (2013) employed the same quality factors with Task Technology Fit (TTF) to examine the IS impact on the performance of users in Tunisian industry. In spite of insights provided by their results, they

called for further investigation such as improving the measurement scale of variables and the service perspective.

More recently, Tam and Oliveira (2016) investigated the functionalities of the ERP factors of D & M IS success model (1992, 2003) and factors from Task Technology Fit (TTF) as direct and moderating affect to evaluate the impact of mobile-banking on individual performance. The result revealed that use and user satisfaction are key precedents of individual performance and also TTF has moderating effect over use to user performance. Moreover, user satisfaction is affected by ERP quality factors Information Quality (IQ), System Quality (SQ), Service Quality (SRQ) providing new insight to managers to apply strategies for retention of users or attract new potential users. The study further pave ways for integration of IS models for better investigation of ERP systems.

Specifically to end user Eid and Abbas (2017) conducted a study to make an attempt to evaluate the measure of user adaptation of ERP post-implementation on the benefits provide to end users by the ERP systems. The study also examines the moderating effect of user experience with ERP system between the relationships of user adaptations and with both effectiveness and efficiency of user benefits. The insignificance moderating effect of the user experience open avenues for re-investigation of this relationship and further investigation of the user adaptation in terms of user benefits.

Discussion &Conclusion

In continuation, few researchers focus on the ERP system performance evaluation. Only some of the reported articles discussed the impact of ERP systems on the productivity and performance (Shen *et al.*, 2016). Similarly, reviewing the literature on ERP implementation related to performance shows that majority of prior studies measure the impact of ERP systems on performance at organizational level rather than individual and the outcome variables discussed are product quality (Banker, Bardhan, Chang, & Lin, 2006), benefits (Zhu, Li, Wang, & Chen, 2010), financial performance (Ayman & Kamaljeet, 2015), organizational service enhancement (Gorla, Somers, & Wong, 2010), market value (Ranganathan & Brown, 2006), process efficiency (Chou & Chang, 2008), shareholder return (Galy & Sauceda, 2014), competitive advantage (Ram, Wu, & Tagg, 2014), organisational benefits (Almahamid & Awsi, 2015).

Over the years, the activities of adoption of new technologies in organisations are speeding up and in this regard, many firms have invested heavily in ERP systems not only to integrate all business activities into a uniform system but also to achieve effectiveness and

efficiency in their operations. Consequently, for the last two decades, the impact of ERP on productivity and performance has been subject of discussions to researchers and practitioners. To use ERP systems to its potential, individuals must understand the basic principles of ERP, that can lead to take advantage of the capabilities from these systems in terms of efficiency and effectiveness with regard to users (Beheshti & Beheshti, 2010).

In summary, in the implementation of the ERP systems performance of users play a vital role to evaluate its impact. The degree of their system usage directly affects recognized benefits of the implemented system (Tai *et al.*, 2014). ERP systems in post-implementation phase and user performance studies are given less attention, placing them in an area needs more empirical investigation. More research in various environment is necessary to clarify the relationship between ERP systems and its users to provide practitioners and researchers with further valuable insights about this application and users. Furthermore, the above section shows the shortage in studies dealing with user aspects in this area. Thus, recommending future research to provide more insight into the users' factors associated with the implementation and use of ERP system to investigate the impact of these systems on their performance in terms of efficiency, effectiveness and creativity.

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