Critical Factors Affecting Enterprise Resource Planning Implementation: An Explanatory Case Study

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Summary
Knowledge-based pharmaceutical industry in Jordan has adopted ERP system to sustain the competitiveness of the industry in the local and global market. This research examines the essential factors that enable or inhibit the success of ERP implementation. It uses a case study methodology to analyze these factors in terms of a firm's organizational performance and ERP capabilities and functions. As a result of using ERP system the capabilities of the system were either not well utilized or never utilized. Having a deep review at the functions available in the system and the functions used it can be easily concluded that a maximum of 10% of the functions were utilized, meaning that the company paid $450000 to invest only 10% of the cost which is only 31,500, and that a total of 283,500 JD is considered as a sunk cost that is not utilized.
Key words:
Enterprise Resource Planning, Critical Factors, Users Acceptance.

1. Introduction

Knowledge based pharmaceutical industry in Jordan has adopted ERP system to sustain the competitiveness of the industry in the local and global market. ERP systems are highly motivated to actively strengthen internal and external enterprise resources integration (Chin Chen- wen et al, 2007: 70) .

It is a system that effectively integrates all functional business areas such as operations, research and development, accounting, human resources and customer's relationship management with information technology tools. Obviously, applying ERP systems has become critical to the enhancing of the informational integration between internal organizational environment and external business environment. ERP system plays the role of enterprise nervous system by using IT tools and communication means to provide a total integrated solution for business.

That is the case   because during the latter part of 1990s firms have rushed to implement ERP. One study found more than 60 percent of fortune 500 companies has adopted of ERP (Yingjie, 2005: 4).   However, the ERP implementation is costly and complex. Thus, the

difficulties and high failure rate in implementing ERP systems have been widely cited in the IT literature (Davenport, 1998).

This research investigates the critical issues in ERP implementation in a developing country such as Jordan.

The research examines the essential factors that enable or inhibit the success of ERP implementation. It uses a case study methodology to analysis these factors in terms of a firm's organizational performance and ERP capabilities and functions. A case study research method is preferred over field study research because it is focusing on the ERP system implementation within some real-life organizational context in the firm subject of the case study.

2. Literature Review

An enterprise resource planning system is a packaged software system that enables a company to manage the efficient and effective use of resources (Nah Hoon et al., 2003:5).

The evolution of ERP systems have been a high lighted in the information systems literature. Since early 1990s' the literature suggest that ERP systems represent one of the most important information technology categories to emerge in the last decade (Thavapragasam, 2003: 93).

Although ERP has specific features, its application modules vary with system providers (SAP, Oracle).

ERP modules can be divided into 12 groups such as logistics, quality management, enterprise solution, asset accounting, material management, plant maintenance, production planning, project management, and financial accounting module (Lin et al., 2006: 90).

Esteves and Pastor (2001) propose ERP systems as software packages composed of several modules providing an integration of data through embedded business processes across organizational functions and locations (Haines & Goodhue, 2003; Nah, Lau, & Kuang, 2001).

Unlike traditional information systems an ERP system encapsulates reusable best business practices. Implementing ERP requires business process

reengineering, change management, technology innovation and users acceptance.

Numerous enterprises feel impelled by global competition to implement ERP systems but implementing an ERP system is neither inexpensive nor risk free (Shih, 2006: 407). Consequently, seventy percent of fortune 1000 companies have implemented ERP systems in some form with the growth of the ERP application market estimated at 37% from 2002 to 2007 (Shepherd, 2006 : 361).

However, despite the high expectations that usually accompany ERP implementation they are blighted by over expenditure, time delayed and in same cases failure to implement the systems projects. Indeed, over 50% of ERP projects have been considered to be unsuccessful or do not achieve their expectations (Holsapple, et al, 2005: 344).

Common problems when implementing ERP systems occur because of various users' factors and lack of integration between existing systems with ERP applications (Kalbasi, 2007 : 22).

Firms should investigate the alignment between their needs and what an ERP system can do (O'Leary, 2004: 63). Furthermore, ERP adoption and use remain a central concern of IT management. Despite impressive advances in ERP capabilities and functions the troubling problems of underutilized systems continue. Low usage of installed ERP systems has been identified as a major challenge facing organization management (Venkatesh & Davis, 2000:186). Thus, along with an organizational transition to ERP, employees should be retrained, their jobs redefined, procedures redesigned and processes rebuild around core processes of ERP system. ERP implementations have been found to be difficult project to undertake and success is not assured (Nielsen, 2002: 15).

Many ERP systems face implementation problems because of workers resistance (Aladwani, 2001: 260). One of the commonly cited reasons for ERP failures is end users reluctance to use the newly implemented ERP (Nah et al, 2006: 144). Hence, better understanding of end users acceptance/ adoption of ERP systems is essential to ERP implementation success (Umble & Umble, 2002: 25).

The implementation of ERP system may have been successful but end users often make use of a subset of available features (Seymour, et al, 2007: 2).

In conclusion, end users acceptance of ERP systems implementation remains a complex, elusive yet extremely important phenomenon in the workplace. Thus, acquisition and implementation of ERP systems are very effort- intensive processes (Bernroider & Leseure, 2005: 3). The ERP literature contains many cas studies of organizations that have implemented ERP successfully and many other do not achieve any success (Bhatti, 2005: 1).

The literature has also shown that despite technical and organizational problems the success of ERP

implementation began with the managers and end users adoption, acceptance, and usage (Wah, 2000; Amoako-Gyampah, 2004; Zviran, Pliskin, and Levin, 2005; Allen & Kern, 2001; Al-Mashari, 2002). Furthermore, organizational culture has always been significant influence on ERP implementation (Soh et al, 2000; Davis , 2004; Beekhuyzen, 2001).

3. Case Study

A Jordanian pharmaceutical company (X) was founded in 1978 in Amman, Jordan. In the early years, the company's primary focus was on developing a branded pharmaceutical business across the MENA (Middle East and North Africa) Region. Then, in the early 1990's, it expanded outside the MENA region by acquiring a generic pharmaceutical business in the United States and by establishing injectable pharmaceutical operations in Portugal. Since then, the company has expanded significantly both organically and through acquisition. The company expanded into the lyophilized segment of the injectable market through the acquisition of specialized plant in Italy. Meanwhile it was listed on the London stock exchange. In 2007 the company expanded into the German generic injectable oncology market. Therefore, the company feels impelled by global competition to acquire ERP systems. It bought ERP system in 2003 with a cost of 315,000 JDs, the cost includes the software modified according to the users requirements, 20 computer stations, installation cost, and all the additional hardware, software and accessories.

The enterprise resource planning (ERP) system, which is a management level system, was supposed to collect data from various key business processes in manufacturing, production, inventory, dispensing and human resources and stores the data in a single comprehensive data repository where they can be used by other parts of the business.

As a result of using the system, it was also supposed that the information that was previously fragmented in different systems can seamlessly flow throughout the firm so that it can be shared by business processes in the different departments.

But unfortunately, the capabilities of the system were not well utilized. Table (1) shows some of the inventorial functions related to the warehouse departments that the ERP system can offer and if these functions were used or not.

Furthermore, the ERP system offers a lot of important function in the "dispensary unit". Dispensary unit is one of the most important areas in any industry, it links the warehouse with the production or formulation department through dispensing of the required raw materials. The computer information department manger of X-

Pharmaceuticals says: " 90% of the non-technical mistakes occur in the production and formulation departments are related to the dispensary unit". Therefore, the elimination of dispensing errors is a prime reason why an information system must be implemented.

Table 1: Some of the inventorial Functions of the ERP system

Function	Is the function Used (Yes/No)	Reason in case not used
Register for the quantity of materials and products.	Yes	
Register for the location of materials and products	Yes	
When there is a shortage in one of the raw materials, the system can automatically ask the defined suppliers for quotations on the raw materials, then it compares the prices and send purchase orders.	No	No trust in the system
Once any new material is received in the warehouse, the system automatically sends emails to the related department to inform them about the receipt of the materials.	No	The different functional departments didn't care about this function and the usual ways of communication (e.g. by phone) were used.
In case any material spend more than the dedicated time in the warehouse without going through the required chemical analysis, the systems send alarming emails to the labs and the related departments informing them about the situation.	No	People in the labs starts pretending that they haven't checked their emails or emails were not received because of problems in their computers or the network. After short period of time the function was not used and they went back to the old traditional way (paper work and official procedures)
Automatic printing of labels for the raw materials	No	The special printer came with the system was not used after the first break down, instead Microsoft word was used.

Nevertheless all the functions of the ERP system related to the dispensary units of X-Pharmaceuticals were not used. Table (2) shows some of the dispensing functions that the ERP system of X-Pharmaceuticals can offer and if these function were used or not.

In addition to what have been mentioned above, it is also worth mentioning that most of the functions in the production and human resource modules were not used.

Table 2 : Some of the Dispensing functions of the ERP System

Function & Benefit	Is the function Used (Yes/No)	Reason in case not used
Uses and prints a barcode on the stock label to identify the material to be dispensed, for this reason it is not possible to identify and dispense the wrong ingredient, in manual systems. There is a possibility that an operator can dispense the wrong material by misreading the name (e.g. Glucose monohydrate instead of Glucose anhydrous)	No	The use of the function was not enforced by the IT or the functional departments managers
Using a predefined tolerance for each material before weighting to guarantee the dispensing of the correct weight of material, in manual systems errors of weight dispensing are frequent, such as: mathematical mistakes, misreading the balance display or transposing figures-for example reading 0.912 instead of 0.921)	No	The managers thought of it more of a "fad" than a practical function, they claimed that double checking of weights is more than enough.
Reads the barcode on the stock label and if the lot has expired, it warns the operator and does not allow the expired lot to be dispensed	No	Traditional systems were used, quality assurance checks were considered satisfactory.
Enforces cleaning regime associated with dispensing a particular material, also it is configured to require a second operator approval on the cleaning once completed.	No	Log books documentation were used instead.
If toxic materials are to be dispensed, the systems warns the operators to wear the appropriate personal protective clothes or if a particular container exceeds a specified weight it warns the operator to use a lifting device.	No	Traditional command of order and written procedures were used instead
Some materials need to be dispensed under environmental controls (such as temperature and humidity), if the conditions are unsuitable, the system does not allow the material to be dispensed.	No	Traditional environmental control systems and manual data logging were used instead

The computer information department manger of X-Pharmaceuticals also comment:" it appears to me lately that the current information systems of the accounting and sales departments cannot be integrated with the EPR

system and this will create many problems in the future when we will try to qualify the whole EPR system again". Having a deep review at the functions available in the system and the functions used, it can be easily concluded that at most 10% of the functions available were utilized, meaning that the company paid $ 450000 to invest only 10% of the cost which is only 31.500 and that a total of 283.500 JD is considered as a sunk cost that is not utilized. The IT manger comments and says:" we even could have paid less than 30,000 JD to a local supplier and have the functions that we are currently using, another important issue is the time that could have been saved if the system was used in the correct way "

4. Conclusion and Findings

The results of this research correspond with expectations. The findings show that problems of the management's approach of implementing ERP, users acceptance, trust, work habits, and cultural attitudes all have both direct and indirect effects on the system usage.

One of the main reasons of ERP implementation failure to achieve expected benefits is because the systems are not completely accepted by end users. Users often use a subset of the available features. In addition, the big bang approach of implementing ERP systems is not suitable to the organizational environment in the X-Pharmaceutical, case company.

The main mistakes that X-Pharmaceutical case company have made can be summarized into the following points:

1. Lack of the strategic vision to enhance the implementation of ERP functions.
2. The employees were not trained to be familiar with such a system, even the managers at the functional level were afraid to deal with IT.

3. Failure of top management and IT department to recognize that effective use of ERP system requires strategic alignment between business and the system. Achieving alignment between ERP and business involves time, trust, effective relationship, users acceptance strong, support from top management as well as deep understanding of the strategic alignment maturity process.

4. The case–based research describes the lack of such an analysis and motivates the need for ERP system.

Finally, the research contributes to ERP studies and practice by using explanatory case study research method to assess the post implementation of the system. Most the researchers tend to focus on issues relating to the implementation and adoption of ERP system as a new technology.

References

[1] Aladwani Adel M. (2001). Change Management Strategies for Successful ERP Implementation, Business Process Management Journal, Vol. 7, No. 3.
[2] Allen, D. and T. Kern (2001). Enterprise Resource Planning Implementation: Stories of Power, Politics, and Resistance, in Proceedings of the IFIP working Group 8 – 2, Conference on Realigning Research and Practice in Information Systems Development: The Social and Organizational Perspective, Boise, Idaho, USA.
[3] Al-Mashari, M. (2002). Enterprise Resource Planning (ERP) Systems: A Research Agenda, Industrial Management & Data Systems, Vol. 102, No. 3.
[4] Amoako – Gyampah, K. (2004). ERP Implementation Factors a Comparison of Managerial and End-User Perspectives, Business Process Management Journal.
[5] Beekhuyzen J. (2001). Organizational Culture and Enterprise Resource Planning (ERP) Systems Implementation. Honours Dissertation, School of Computing and Information Technology, Griffth University, Nathan, Brisbane, Australia.
[6] Bernroider Edward W.N. and Michel J. Leseure (2005). Enterprise Resource Planning (ERP) Diffusion and Characteristics According to the Systems Lifecycle: A Comparative View of Small – to Medium Sized and Large Enterprise, Vienna University of Economics and Business Administration, Vienna, August, Published Online by http://epub.wu-wien.ac.at.
[7] Bhatti T.R. (2005). Critical Success Factors for the Implementation of Enterprise Resource Planning (ERP): Empirical Validation, the second International Conference on Innovation in Information Technology, Zayed University, College of Business, Dubai, UAE.
[8] Chin Chen-wen et al (2007). An Empirical Study on the correlation Between ERP Knowledge Management Implementation and Enterprise operating performance in Taiwan's Industries, International Journal of the Computer, the Internet and Management, Vol. 15.
[9] Davenport, T.H. (1998). Putting the Enterprise into the Enterprise System, Harvard Business Review.
[10] Davis, C.H. (2004). Perceived Effects of ERP on Jobs and Work in a Contact Centre. Proceedings of the International Conference on work with computer systems, Kula Lampur, April 4.
[11] Esteves J.M. and A.J. Pastor (2001). Enterprise Resource Planning Research: An Annotated Bibliography, Communications of the Association for Information Systems.
[12] Haines, M.N. & Goodhue, D.L. (2003). Implementing Partner Involvement and Knowledge Transfer in the context of ERP Implementation, International Journal of Human – Computer Interaction, 16.
[13] Holsapple Clyde W., et al. (2005). Empirically Testing User Characteristics and Fitness Factors in Enterprise Resource Planning success, International Journal of Human

– Computer Interaction, 19 (3). Lawrence Erlbaum Associates, Inc.

[14] Kalbasi Houman (2007). Assessing ERP Implementation Critical Success factors (a Case Based Study), Masters Thesis, Tarbiat Modares University, Faculty of Engineering, Department of Industrial Engineering.

[15] Lin.W.T. et al (2006). A study on performance of Introducing ERP to Semiconductor Related Industries in Taiwan, Springer –Verlag.

[16] Nah Hoon – Fiona Fui, et al. (2003) ERP Implementation: Chief Information Officers Perceptions of Critical Success Factors, International Journal of Human – computer interaction, 16 (1), Lawrence Eribaum Associates , Inc.

[17] Nah Hoon- Fiona Fui, et al . (2006) Toward a Greater Understanding of End- User's Acceptance of ERP systems /in/ Advanced Topics in Information Resources Management, edited by Mehdi. Kosrow- Pour, Vol. 5, Idea Group Publishing.

[18] Nah, F.F., Lau, J.L. and Kuang, J. (2001). Critical Factors for Successful Implementation of Enterprise Systems, Business Process Management, 7 (3).

[19] Nielsen Jens Laurits (2002). Critical Success Factors For Implementing An ERP System in A University Environment: A Case Study from the Australian HES, Faculty of Engineering and Information Technology, Griffith University.

[20] O'Leary Daniel E. (2004). Enterprise Resource Planning (ERP) systems: An Empirical Analysis of Benefits, Journal of emerging Technologies in Accounting, Vol. 1.

[21] Seymour Lisa, et al. (2007). End-Users Acceptance of Enterprise Resource Planning Systems: An Investigation of Antecedents, Proceedings of the 6th Annual ISONE world Conference, April, Las Vegas, NV. Available at http://www.isoneworld.org.

[22] Shepherd Craig (2006). Constructing Enterprise Resource Planning: A Thoroughgoing Interpretivisit Perspective on Technological Change, Journal of Occupational and Organizational Psychology, The British Psychological Society (79).

[23] Shih Ya- Yueh (2006). The Effect of Computer Self – Efficacy on Enterprise Resource Planning Usage, Behavior & Information Technology, Vol. 25, No. 5, September – October.

[24] Soh, C., Kien, S.S., and Tay-Yap, J. (2000). Cultural Fits and Misfits: Is ERP a Universal Solution?, Communications of the ACM, 43 (4).

[25] Thavapragasam Xavier Thararuban (2003). Cultural Influences on ERP Implementation Success, Proceedings of the first Undergraduate Students Computing Conference, Griffith University, Nathan , Brisbane , Australia.

[26] Umble, E.J., and Umble, M.M. (2002). Avoid ERP Implementation Failure. Industrial Management, 44 (1).

[27] Venkatesh Viswanth and Fred D. Davis (2000). A Theoretical Extension of the Technology Acceptance Model: Four Longitudinal Field Studies, Management Science, Vol. 46, No. 2, February.

[28] Wah, L. (2000). Give ERP a chance. Management Review, 89 (3).

[29] Yingjie Jiang (2005). Critical success Factors in ERP Implementation in Finland, M.Sc. Thesis in Accounting, the Swedish school of Economics and Business Administration.

[30] Zviran, M., Pliskin, N. and Levin, R. (2005) Measuring User Satisfaction and Perceived Usefulness in the ERP Context, Journal of computer Information Systems, 45 (3).