Examining critical success factors affecting ERP implementations in enterprises of Pakistan

Muhammad Aamir Obaid Khattaka*, She Yuanguana, Muhammad Irfana, Riffat Aasmah Khattakb, and M. Shoaib Mansoor Khattakb

aDongling School of Economics and Management, University of Science and Technology Beijing, China
bArmy Public College of Management Sciences, National University of Modern Languages Islamabad, Pakistan
*Corresponding author:

Abstract

Substantial investments have been made by organizations all over the world in implementing enterprise resource planning (ERP) systems due to its effectiveness, efficient as well as integrative capability and that is why the importance in its usage has greatly increased in today’s dynamic business environment. This study provides an overview of ERP system implementation success by qualitatively examining the relationship of each of the proposed Critical Success Factors to its implementation and to see the project completion success in terms of organizational impact, on time and under allocated budget by using multiple case studies approach. Findings confirm that 11, 6 and 3 out of the 20 proposed factors, identified from the literatures, are critical, least critical and not critical respectively. This study will help to timely as well as better understand the most relevant and tested factors to reduce/eradicate the chances of failure and thus would contribute to the existing body of knowledge regarding ERP project implementation success.

Keywords: Enterprise resource planning, critical success factor, proposition, case study

1. Introduction

After realizing advantages of intra- and inter-organizational integration as well as for the sustainable competitiveness in today’s rapidly changing global marketplace, many organizations worldwide irrespective of their size and scope have implemented or are in the process of implementing Enterprise Resource Planning (ERP) systems. ERP system is actually a strategic tool that may help an organization to gain an edge in successfully integrating key business operations as well as properly planning, synchronization and optimization of the available resources in the marketplace better than the competitors. It carries with itself a most effective functionality aspect in planning especially in supply chains and is among the most significant enablers for the business intelligence (Ge and VoB, 2009) and hence can provide better solution to an entire business enterprise by making it more real time-sensitive. Because of awareness and realization of benefits and advantages associated with ERP systems and the growing need for replacement of the old aging and irreconcilable legacy information systems, its usage has greatly increased and therefore substantial investments have been made by the organizations all over the world. Foregoing in view of the significance of such system for achieving sustainable competitive advantage and the expenditure associated with its adoption/installation, out of the firm’s available scarce resources, triggers that individual(s) or team(s) who is/are responsible for its implementation and scholars who study them are required to know the actual and most tested factors proposed in the management literatures in order to increase the chances of ERP implementation success and to avoid the time as well as cost overruns and this is what precisely the aim of this study to examine the most critical factors that may lead to a successful ERP implementation by applying the organizational impact dimension of information system success (ISS) model (DeLone and McLean, 1992 and 2002) for success assessment together with on time and under allocated budget for project completion as being the success measures (Bradley, 2008) in context of developing country like Pakistan. Number of scholars found Critical Success Factors (CSFs) for various small-, medium- and large-sized organizations in different region/countries with mostly in the developed countries particularly in USA (Mabert et al., 2000, Tarafdar and Roy, 2003, Kumar et al., 2003, Ngai et al., 2008, Huang, 2010). Ngai et al. argued that the scholars could consider investigating the CSFs for ERP implementation in developing countries to check for the differences, also motivated this research to be conducted in context of the developing countries like Pakistan. As very limited studies in this regard have
been conducted (Shah et al., 2011) and therefore, there is a need to undergo in-depth studies for better exploration of the phenomena.

This research is in continuation of the author’s previous work of qualitatively examining CSF’s for ERP implementation success (Khattak et al. 2012), using a multiple case studies approach (Yin, 2003), in the context of developing country like Pakistan. Ten additional factors are included to provide a more consolidated view of as to whether the CSFs proposed and recommended in the management literature are practically considered while implementing ERP projects for better management of the enterprises and also to find whether these identified factors are related to the project success or otherwise. The reason as to why Pakistan was chosen because structure of ownership there varies among different organizations like state-owned organizations, multinational (foreign-invested) firms and private enterprises. Our findings confirm that 11, 6 and 3 out of the 20 proposed factors are critical, least critical and not critical respectively which contribute to the existing body of knowledge regarding the critical factors for ERP project implementation success.

This paper is organized as follows: the next section illustrates the literature review followed by the identification of factors cited in the literature and the development of propositions subsequently. Research methodology follows with literature review. The developed propositions are subsequently tested in the prepared four case studies in the next section. Discussion is made on findings in the research. Finally the limitations and conclusion about the study ends the paper.

2. Literature review

2.1 Enterprise Resource Planning Systems

Ge and VoB (2009) define ERP as "It is a highly integrated enterprise information system to manage all aspects of the business operations of an enterprise (especially regarding transactional data) including production, purchasing, engineering design, manufacturing, sales, marketing, distribution, accounting and customer service, etc’’ and argue that it enables enterprises to manage the aforementioned business activities using the most relevant information on a continuous and real-time basis among all the locations or branches of an enterprise and that ERP system’s successful implementation into the enterprise may produce very useful benefits like integration of supply chain management issues, customer service improvement, sophisticated production scheduling by supporting business strategies and business process re-engineering that may help in reducing costs of manufacturing as well as attaining competitive advantage in the marketplace.

The trend in adoption and implementation of ERP systems as being an effective solution to a number of business processes and activities can be traced back to the early 90’s with material requirements planning (MRP) and manufacturing resource planning (MRP-II) being its precursors and after perceiving its usefulness it was subsequently adopted by the number of enterprises. By now it is very consistently realized that to obtain a rapid and sustainable growth, the today’s organizations have to be gathered collectively on a common platform by making an effective network of suppliers, customers, partners, distributors, retailers etc., and they should actively be engaged by continuously updating themselves to the emerging technologies particularly in the field of information systems for better management of the resources as well as enterprises and that is why the significance of such systems like ERP has increased. Firms must learn the new ways or methods of engagement by adopting more advanced inter-organizational information technology systems to achieve the goals of agility and flexibility. This explanation indicates that ERP systems are not just IT software rather it brings with itself partial or complete changes in organizational performances, processes and operational activities. It may help the top management in strategic decision makings for effective and efficient control and better management of the entire enterprise and may assists in making business processes standardized because of the its reliability, information quality and higher response rate. Being comprised of multi-modules, ERP is seen as a solution for improvement in productivity, effectiveness (both process and operational) and entire business performance (Upadhyay et al., 2010). By analyzing its planning functionality aspects many organizations have realized its importance for achieving and sustaining strategic competitiveness (Everdingen et al., 2000).To cater for all such needs the organizations are on their way to adopt/implement ERP systems to integrate their business process and activities (Dalal et al.,2004).

There are evidently several obstacles and constraints associated with the adoption/implementation of the ERP systems; for example these are resource-intensive and being complex and complicated in nature their implementation is often more time-consuming and may require more than usual efforts/commitments,
financial resources, advanced knowledge/skills, level of top management involvement/guidance, to name some of few. That is why many of the ERP systems implementation failed, delayed or stopped and in some cases, though the system are purchased along with multiple modules, the organizations including manufacturing or service oriented as well as in educational institutions able to execute only some of the basic modules as being uncertain about its potential benefits and thus suffer losses in terms of various resources (for details see Davenport, 1998; Pozzebon, 2000; Wah, 2000; Bray, 2004; Songini, 2004). Furthermore, many individual as well as group studies (like Gartner’s studies) in the academia found the failures and difficulties that firms went through particularly during implementation of ERP systems. However, Hitt et al. (2002) found that higher performance has been noticed in the firms, which opted for and implemented the ERP systems. This may be true if the ERP systems are implemented successfully by aligning it with a firm’s competitive priorities, as found by Yen and Sheu (2004), and taking into due consideration the most tested critical factors for success.

2.2 ERP Systems in Pakistan

Since its beginning in early 1960s, the information technology as a whole in Pakistan has moved with a very sluggish pace and met slow introduction. The custom duties & other import taxes were very high and it was very difficult for a company engaged in software development to get import license from the government (Shaukat, 2009). However, in 1980s with backing and support of Government of Pakistan, the massive computerization in the country began and the companies started using computers in their significant functional areas for the growth and development of their businesses. Rehman (2001) argued that the government’s policies and action plans regarding IT development intend to involve almost all areas of economy like commerce & industry, banking and insurance, revenue/finance, communication/media, human resource development, and defense, to name some of few.

In Pakistan, first private software development company was formed in 1977 by the name of Systems Private Limited. In order to facilitate the enterprises in effectively planning and managing different business resources, now different ERP systems have been implemented by the Pakistani organizations in its most advanced forms. ERP solutions like mySAP, Oracle’s JD Edwards, Oracle’s EBS, Sunsystems and Microsoft Dynamics are among the most popular ones, which link the different activities like inventory, sales, orders, purchase, manufacturing, supply chain and warehouse management modules with instantaneous, reliable, precise and accurate information availability to every individual user or department in the entire enterprise. Akhtar (2011) argued that Pakistan has a well-developed communications infrastructure, and a high degree of computer literacy, coupled with innovations in software development. Several organizations like Shell Pakistan Limited, Sui Southern Gas Corporation, Total Parco Pakistan Limited, Pakistan Space and Upper Atmosphere Research Commission, Unilever Pakistan Limited, Pakistan Tobacco Company, Institute of Space Technology, Telenor Pakistan Limited, Pakistan Telecommunication Company Limited (PTCL), etc., in Pakistan have already implemented and others are planning to go live to streamline or standardize their business processes.

2.3 Critical Success Factors

Bullen and Rockart (1986) defined CSFs as “the limited number of areas in which satisfactory results will ensure successful competitive performance for individual, department, or organization”. Having comprised of multiple software modules, several complications and complexities are associated with implementation of ERP systems and thus require more than usual efforts, time and resource expenditures. Most of the ERP implementation projects witnessed failure at the end because of not keeping in due consideration factors that are vital to the success both prior and during different implementation phases. Markus et al. (2000) argues that the full benefits of ERP systems can only be achieved if it is to be implemented successfully in an organization. The difficulties and issues in implementing ERP systems are widely cited in literatures (for detail see Holland and Light,1999; Parr and Shanks,2000; Zhang et al., 2002; Wallace and Keil,2004; Bhatti, 2005; Vineet, 2006; Ramayah et al., 2007; Iftikhar and Hassan,2008; Singh and Wesson,2009; Huang, 2010; Wood,2010). ERP implementation is somewhat a complex and challenging exercise and number of the organizations who have adopted such systems are confronted with different kind of difficulties during different phases of implementation (Markus et al., 2000 and Xue et al., 2005) and many cases regarding its non-completion have been reported because of either cancellation or over budget and/or time overruns (Kumar et al., 2002 and Scott et al., 2000). Zhang et al.(2002) witnessed a success rate of only 33% with the ERP implementation in different organizations. Many studies to seek solutions to such tendency of unsuccessfulness have been conducted in past to critically identify the success factors. Ngai et
al. (2008) argued that by identifying the most relevant CSFs an organization can take effective measures to eliminate or minimize the causes that are negatively affecting the ERP systems implementation. Despite numerous studies in the CSFs’ context there is, however, reached no general harmony as to which set of factors are most vital or critical to the ERP implementation success (Zhang et al., 2003) and that is why different sets of factors used to be generated there and then. One of the possible reasons may be due to different samples selection in different regions or countries having different national/organizational cultures, government/corporate laws or regulations and different level of economic environments.

For the current study, twenty (20) CSFs are identified after a comprehensive and thorough review of literature and propositions are then subsequently developed in the next section. A consolidated list of CSFs that are mostly cited in literatures, by various scholars as mentioned against each, is illustrated in Table I:

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Critical Success Factors (CSFs)</th>
<th>Citations</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Selection of a right full time project manager with extensive experience</td>
<td>Wight, 1974; Frantz et al., 2002; Flosi, 1980; Brown and Vessey, 2003; Somers and Nelson, 2001.</td>
</tr>
<tr>
<td>2</td>
<td>Reporting level of the Project Manager</td>
<td>McAfee, 2003; Bradley, 2008.</td>
</tr>
<tr>
<td>3</td>
<td>Quality (adequacy) and quantity of training and education of personnel/users</td>
<td>Nelson and Cheney, 1987; Lassila and Brancheau, 1999; Umble et al., 2003; Wah, 2000; Bradford and Florin, 2003; Bradley and Lee, 2007; Coetzee, 2000; Wheatly, 2000; Somers and Nelson, 2001; Zhang et al., 2002; Bhatti, 2005; Al-Mashari et al., 2006; Yuanqiang et al., 2009; Noudoostbeni and Norizan, 2009; ZhouSivenun, 2005; Robey et al., 2002; Kumar et al., 2010; Woo, 2007; Almahdi et al., 2008; Anjum and Rehman, 2010; Garg, 2010; Upadhyay and Dan, 2008; Nah and Lau, 2001; Jafari et al., 2006; Ranzhe and Qiu, 2007; Kale et al., 2007.</td>
</tr>
<tr>
<td>4</td>
<td>Presence/Existence of a Champion</td>
<td>Somers and Nelson, 2001; Beath, 1991; Wilcock and Sykes, 2000; Summers, 2000; Brown et al., 2007; Parr and Shanks, 2000; Upadhyay and Dan, 2008; Nah and Lau, 2001; Nah et al., 2003; Nga et al., 2008; Parr et al., 1999; Summer, 1999.</td>
</tr>
<tr>
<td>5</td>
<td>Role and effectiveness of management in reducing the users’ resistance</td>
<td>Lapoint and Rivard, 2005; Forumo and Melcher, 2006; Zhang et al., 2002; Bhatti, 2005; Lindley et al., 2008.</td>
</tr>
<tr>
<td>6</td>
<td>Use of Steering Committee for control purpose</td>
<td>Gupta and Raghunathan, 1989; Mabert et al., 2003; Brown et al., 2007; Ngai et al., 2008; Parr et al., 1999; Zhang et al., 2003.</td>
</tr>
<tr>
<td>7</td>
<td>Integration of Business Planning with ERP planning</td>
<td>Reich and Benbasat, 1996; Luftman et al., 1999; Brancheau and Wetherbe, 1987; King, 1978; King and Zmud (1981); Kears and Lederer, 2001; Das et al., 1991; Keen, 1993; Oh and Pinsonneault, 2007; Whalen, 2007; Peppard and Ward, 1999; Peppard, 2001; Brown et al., 2007; Luftman et al., 2006; Steven Institute of Technology, 2007; Law and Ngai, 2007; Singla and Goyal, 2005; Hong and Kim, 2002; Davenport, 1998.</td>
</tr>
<tr>
<td>8</td>
<td>Use and role of Consultant</td>
<td>Welti, 1999; Davenport, 1998; Chen et al., 2008; Upadhyay and Dan, 2008; Kumar et al., 2010; Holland and Light, 1999; Ge and VoB, 2009.</td>
</tr>
<tr>
<td>9</td>
<td>Top management support/ involvement</td>
<td>Kotter, 1990; Mabert et al., 2003; Laughlin, 1999; Jarvenpaa and Ives, 1991; Bradford and Florin, 2003; Brown and Vessey, 2003; Liang et al., 2007; Huang, 2010; Vincee, 2006; Wallace and Keil, 2004; Kumar and Hillegersberg, 2000; Rasmy et al., 2005; Bhatti, 2005; Keil et al., 1998; Woo, 2007; He, 2004; Ge and VoB, 2009; Zhang et al., 2002; Davenport, 1998; Holland and Light, 1999; Nah et al., 2003; Almahdi et al., 2008; Anjum and Rehman, 2010; Abdelghaffar et al., 2010; Garg, 2010; Nah and Lau, 2001; Jafari et al., 2006; Kale et al., 2007; Upadhyay and Dan, 2008; Yuanqiang et al., 2009.</td>
</tr>
<tr>
<td>11</td>
<td>Competency in use of IT and IT infrastructure</td>
<td>Nelson and Chenay, 1987; Upadhyay and Dan, 2008; Themistocleous, 2002; Huang and Palvia, 2000; Zhang et al., 2002; Almahdi et al., 2008; Abdelghaffar et al., 2010.</td>
</tr>
<tr>
<td>12</td>
<td>Clearly specified goals/objectives/scope</td>
<td>Syed Ifthikar and Hassan, 2011; Upadhyay and Dan, 2008; Holland and Light, 1999; Nah et al., 2003; Jafari et al., 2006; Zhang et al., 2003; Ngai et al., 2008; Kumar et al., 2010.</td>
</tr>
</tbody>
</table>
| 13    | Business Process Re-engineering/ Customization                                               | Wood, 2010; Zhang et al., 2002; Singh and Wesson, 2009; Syed Ifthikar and Hassan, 2008; Hammer and Champy, 2001; Subramonium and Tounsi, 2009; Markus et al., 2000; Holland and Light, 1999; Law and Ngai, 2007; Ngai et al., 2008; Gattiker and Goodhue, 2002; Mabert et al., 2000; He, 2004; Davenport, 1998; Hong and Kim, 2002; Bingi et al., 1999; Nah et al., 2003;
2.4 Development of propositions for empirical testing

After going through the aforementioned literature review, following propositions are developed which are to be tested empirically through multiple case studies approach so as to see whether these are practically considered by the organizations in Pakistan while implementing ERP systems or otherwise and to find out which of the factors are most critical, least critical (i.e., which do not differentiate between successful and unsuccessful projects) and not critical at all. The propositions are as under:

- **P1**: Selection of a right full time project manager with extensive experience whose sole responsibilities is the project is positively related to the successful implementation of ERP project.
- **P2**: Reporting level of the project manager that is an organizational structure in which the project manager directly reports to the business division’s senior management is positively related to implementation project success.
- **P3**: The quality (adequacy) and quantity of training and education of personnel/users are positively related to successful implementation of ERP project.
- **P4**: Presence/existence of a Champion in implementation of an ERP project is positively related to successful implementation of ERP project.
- **P5**: Role and effectiveness of management in reducing the resistance to change among system’s users in an organization is positively related to implementation project success.
- **P6**: Use of Steering Committee for monitoring and controlling is positively related to successful ERP implementation.
- **P7**: The level of integration of business planning with ERP planning is positively related to implementation project success.
- **P8**: Use and role of consultants for guidance and support in an ERP project is positively related to successful ERP implementation.
- **P9**: Top management support or involvement in the planning and implementation of ERP systems is positively related to implementation project success.
- **P10**: Understanding change management culture and strategy/programs of the adopting organization that is a high level of proficiency to change is positively related to implementation project success.
- **P11**: Level of competency in use of IT and availability of an appropriate IT infrastructure is positively related to ERP implementation success.
- **P12**: Clearly specified goals/objectives/scope of ERP projects to the organizational members is positively related to ERP implementation success.
- **P13**: A certain level of business process re-engineering and minimal customization to fit into current processes of the organization is positively related to ERP implementation success.
- **P14**: The Involvement of organizational members/users in adoption and implementation of ERP is positively related to ERP implementation success.


**P15**: Ease of system’s use and thus user acceptance is positively related to ERP implementation success.

**P16**: The selection of a suitable vendor for the purpose of supporting implementation of the project is positively related to ERP implementation success.

**P17**: Effective project management skills to plan, coordinate and monitor the implementation activities related to ERP systems is positively related to ERP implementation success.

**P18**: Effective as well as clear communication among the organizational members at all levels before and during the implementation phases is positively related to ERP implementation success.

**P19**: Selecting and developing a suitable ERP strategy and implementation methodology is positively related to ERP implementation success.

**P20**: A balanced team for ERP implementation particularly comprised of both business/functional and IT personnel are positively related to ERP implementation success.

### 3. Research Methodology

Data for the research was collected through a survey investigating adoption and implementation of ERP systems with a limited sample of four organizations responding to it, which accomplished the task or most of the significant phases of the implementation at least three to four years prior to the study in question. The reason being it had been found that after a lapse of at least two years of the completion of ERP project implementation, its performance effects of return on investment could be seen and hence better judged (Nicolaou, 2004a). Hunton et al. (2003) also found that after a reasonable time period of at least two years, a difference in financial performance among the firms, which had adopted and not adopted the system under question, could be witnessed. After a lapse of two to three years of the implementation, other significant benefits like organizational, managerial, strategic, operational and IT improvement, associated with ERP system could be seen to happen (Shang and Seddon, 2002).

A structured questionnaire, comprised mostly of close-ended questions, followed by interviews, was used into which the developed propositions were constructed to get the data and was subsequently sent through email, before interviewing the concerned officials for their convenience, to a limited sample of seven organizations during months of September and October 2011. Initially the questionnaire comprised of 77 open-ended questions and was sent to some of the researchers’ senior colleagues as well as one of the organizations for pilot study in order to check its validity and to seek suggestions for improvements prior it’s sending to the targeted sample. In the light of certain useful comments, additional effort was exerted to make it more precise and finally it was reduced to 56 questions (see Appendix A). The success of the project was measured by questions about on time and on/under budget project completion and the impact of the ERP systems on the entire enterprise because Bradley (2008) argued that a project is said to be successful only if it is got to be completed within both the scheduled time & allocated budget and demonstrating positive impact on the organization as a whole. Purpose of obtaining the data was to prepare case studies for testing the propositions developed in the study. Only four organizations responded and therefore the overall response rate was 57 % (approx). Criteria for the selected sites comprised of both of manufacturing and service sectors and the same were located by making a thorough research using reference lists, internet, guidance from the former teachers/professors and the organizational colleagues of the researchers. Two of the selected cases were operating privately and rests of the two were from public sector. Within the selected sites, first ERP implementation project began in 1998 and the last in 2006. Three different software packages were used in the four cases including *oracle*, *mysap* and *sunsystems*. All the respondents were working at managerial positions with having considerable experience of more than seven years on average and participated as key players in the implementation processes in their relevant organizations. The respondents in the study were asked to describe each of the identified factors on a 5-point Likert scale for their agreement/disagreement and importance of the same, which established whether respondents agreed to the factors, selected by the researchers for the current study and/or gave importance to those. In general, the respondents agreed with the majority of the factors and considered them to be important also for ERP implementation success, which provided supporting evidence that the proposition developed for testing those in context of developing country like Pakistan had practical implications and thus triggered to advance further into the research. Most of the questions were answered vide return email and response to the rest of questions were seek and clarified during the interviews. The answers were thoroughly reviewed and in cases where any sort of confusion observed were sent back to the concerned respondent(s) through email to get it clarified with follow up by email, calling them on their phone numbers and also using other communication tools to ensure the accuracy and reliability of data.
The questionnaire was designed in a manner that some questions were to get demographic data of the company and rest of the questions implied the identification of our identified propositions on the basis of which different case studies were prepared to see and to draw conclusions as to which of the proposed factors were practically considered prior and during the project implementation and also to examine which of the factors are critical and least critical i.e., if considered, it can not necessarily guarantee a project’s success and finally to conclude which of the factors, already supported in the published literature, are not supported in the case studies in the current research. Finally the collected information was validated by sending respondents copies of the draft of their case studies write-up on their email addresses asking them to indicate errors or amendments or omissions or misstatements as well as understatements, if any. All this was done to eliminate any kind of biases in researcher’s interpretation of the collected data to ensure its accuracy & reliability for preparation of case studies for validated results. Consents were obtained from the management of each case site for finally publishing the necessary contents, out of the collected data, in case studies in this paper to avoid any inconvenience in future.

3.1 Case studies:

3.1.1 Case 1:

3.1.1.1. The organization/company: Institute of Space Technology (IST) is a public sector organization located in Islamabad (the capital city of Pakistan) aiming at producing scientists and engineers in the field of space technology. It is a federally chartered degree awarding Institute, established in 2002 and offers degree programs in engineering disciplines of Aerospace, Communication Systems and Material Sciences. The Institute aims at providing quality education to diverse groups of national and international students within the country. The institute employed almost 500 people and being a not-for-profit public sector organization, the management had not provided the financial figures.

3.1.1.2. The project: The project started in February 2004 with the top management decision to develop an in-house ERP system for improvement in administrative related activities and bringing automation in its human resource processes/policies, finance/accounts, payroll, store and procurement, fleet management/maintenance & transport system, complaint monitoring, etc., and set it as one of the primary goal for the organization. Maximum of the working processes were manually executed prior the management’s decision of going for the ERP system implementation. The primary objective behind the project was to streamline the entire system to eliminate delays & ambiguities, to have a paperless environment and controlling the entire administrative as well as academic related activities for enhancing the improvement of the entire organization. Management was clearly of the view that the implementation of ERP system would be in best interest of the organization and is worth the investment. Oracle software was selected for in-house development of ERP. A parent organization of IST was already using that software. Furthermore, the project was so formal that IST hired software developers as full time employees to develop their ERP system and also allocated specific time and cost budget for the same purpose.

3.1.1.3. The propositions: The ERP system was developed in accordance with the business processes of the organization and was strongly supported by IT. However, substantial improvement in level of integration witnessed after completion of the project. IT/IS executives were well aware of the current as well as overall objectives of the organizational business processes and understanding regarding role of IT or IS in the organization’s mission was the same among the business and IT/IS managers/executives that is they both shared the same vision. As the project was initiated formally therefore, a project manager was hired and appointed as full time manager. A formal procedure was adopted for selection of the project manager with the focus on looking for the particular things like total working experience, project management and ERP implementation system experience of the candidates during the interviews. The person who was selected for the project had got practical experience and sound knowledge of working in the organization having similar business processes/activities as of the IST. He was made responsible for the formal implementation of ERP project and was given responsibility as well as authority for decision making related to the said project. He used to report directly to head of the organization (Vice Chancellor of IST). The project was implemented using incremental approach (single-module/phased approach) by taking into account all the relevant phases of the successful software development model as well as with having a proper change management strategy already devised prior the implementation of the project. The biggest challenge in the way of implementation of ERP system was resistance from the employees to adapt to a new computerized system. The top management convinced the employees by effectively communicating and making it clear to them that the ERP project would be beneficial to them in particular and to the organization in general and would be implemented at any cost. The management was aware of
the users’ resistance going to be emerged during the implementation of the project but the effectiveness of the management was instrumental in reducing that resistance. The organizational head took the ERP system implementation as its own project and was actively involved during all the phases of ERP system planning and implementation by more than just approving/allocating the budget and reviewing progress. He understood every component and different phases of the project and greatly helped in addressing delays and resolving outstanding issues including budget review. Since the ERP system was developed as per the goal and procedures of the organization therefore, all stakeholders were involved in the decision making by clearly communicating them the organization’s vision/mission/goals/objectives regarding the ERP system scope and applicability. No specific champion was emerged during the project however, all heads of the departments with having vast working experience, being the member of a steering committee, which was headed by the organizational head, guided the team members by motivating and helping them in minimizing the resistance from the employees/users from time to time to move the project towards success. The major role of the steering committee was to review the progress on the project for the purpose of effective control. In the beginning weekly review meetings were used to be held but later on that were conducted on monthly basis. The project implementation team was properly organized in a sense that it comprised of personnel both from IT and business side who worked as full time members by devoting maximum of their time to the project. Neither support from vendor of the software was obtained nor was any consultant for consultancy purpose hired because management thought that the project manager had enough knowledge & experience of project management as well as ERP implementation. Necessary trainings at the appropriate time were imparted to the concerned personnel particularly to the system users prior and during different phases of the project modules implementation with the primary focus on to give appropriate knowledge of the developed ERP system due to which the users got aware of system’s ease in the usage and thus became satisfied. The programmers, who developed the ERP system, gave training to the concerned users. The training included both business process and software system (system’s demo plus hands on training sessions). Since the ERP system was developed as per the institute’s current business processes therefore, the new ERP system re-engineered the existing business process up to a certain level and hence minimal customization of the software took place to fit the same according to the organization’s business logics and requirements. The project was completed in 2005. All the employees easily adapted themselves to the new system and were quite satisfied with automation of various activities. Also response time, availability of efficient services, useful & accurate data and paperless environment were major areas which were improved tremendously after ERP system implementation. In addition to that working culture inside the organization in terms of helping attitude of the employees, simplification of different operational processes along with time reduction of performing several activities were also improved and affected the organizational performance to a great extent.

3.1.1.4. Results: As the project was completed within the scheduled time, under allocated budget and met the organization’s objective to improve organizational performance by provision of accurate & reliable information for better decision making to the top management, therefore, the project was termed as successful. Also as everything got available at computer’s screens and they did not have to manually search for the files or data for their official work and ease of use of the new ERP systems made them satisfied. One of the major benefits of the ERP System was its reporting module which was developed in accordance with the requirements of the management and stakeholders. The reports were precise and based on the accurate and reliable data available in the system as compared to the old legacy system which really strengthened the organization by making their ERP system as one of the reliable systems of the country as the other sister organizations were also started seeking help to develop/implement the same in their organizations. It not only gave IST a competitive edge over other organizations in the same industry but also improved internal working and culture of the organization to a great extent.

3.1.2. Case2:

3.1.2.1. The organization/company: Shahkar Engineering & Co. (Pvt.) Ltd. was established in 1990 as a privately-owned company. It involves in manufacturing of quality products for industrial markets particularly for large scale multinational companies in Pakistan. An annual sale of the company is about US$8 million and it employed about 600 people. The company already had an old IT infrastructure and was facing problems in getting up to date with the rapidly changing industrial environment. The Company wanted to increase its performance efficiency to stay ahead of the curve by integrating the several activities taking place within the enterprise as one department hardly knew the activities taking place in other department(s) and that’s why the management decided to go for the ERP implementation.
3.1.2. The project: In March 1998, the company initiated the ERP system project. An IT manager who was already looking after the routine affairs of IT in the company was given additional responsibility of the project management. MySap was selected as the software solution. The enterprise wanted to improve its operational processes in particular and overall organizational efficiency in general for better management of the entire enterprise. The project’s initiation was so informal that the management did not properly plan for allocating both time and cost budget and thus did not thoroughly make out the criteria for measurement of the project completion success.

3.1.2.3. The propositions: IT department was given responsibility to initiate the project, which was supported by the business planning but with considerably low integration between them. No project manager in a separate capacity was hired/appointed for the execution of the project. One of the reasons why the IT manager was bestowed of that additional responsibility was that he had got the substantial experience of almost 10 years in project management. But he had very little experience of ERP project implementation and used to devote 70% of his time to the project because he had also other significant non-project related activities to carry out. He used to report to a member in a top management team and conducted software training in the company but educating the users’ about the business process was given least priority. External consultant was hired for providing significant guidance on the project and also support from the vendor about clarification of some software related issues was seek during different phases of implementation. Radical customizations were made to fit the software to best suit to needs of the organization resulting in loss of time and money. The top management involvement was low and limited to approval of the project and was to be involved only in case of decision regarding any business processes was significantly required to be made. No champion came out to guide and supports the implementation team. However, level of communication was from top to bottom and decisions were used to be communicated to employees in order to reduce the users’ resistance. And due to high level of resistance, only part of the software was installed though it was purchased along with having multiple modules. The implementation team also acted as a steering committee and used to meet for progress reviewing whenever it deemed necessary without any proper schedule. The project was implemented using incremental approach (phased approach) but without having any specific change management strategy/program because the organization was not proficient to changes in the past. All concerned users were rarely involved in the decision makings and thus were not clear about the organization’s goals and objectives regarding scope/applicability of ERP system. Both management and users were unaware of the need of going for significant re-engineering in order to fit the existing processes to the new ERP system and hence the users’ satisfaction was relatively low.

3.1.2.4. Results: The project was declared as unsuccessful in the end because lacking of an informal plan made it’s timely as well as under budget completion difficult. And also the project brought with itself insignificant amount of improvements in the overall organizational performance.

3.1.3. Case 3:

3.1.3.1. The organization/company: Pakistan Space and Upper Atmosphere Research Commission (SUPARCO) was formed in 1961. It is mandated to conduct R&D in space science and technology along with their peaceful applications in the country. At present the organization employees about 5000 employees in its different wings, SUPARCO Institute of Technical Training (SITT) is one of its technical educational wing which offers diploma of Associate Engineering in the field of Electronics and Mechanical to meet the intellectual technical requirement of the organization in particular and the country in general.

3.1.3.2. The project: The organization started their ERP implementation project in 2006 in order to develop a system for academic management to integrate all academic activities like admission, record keeping & registration, financial affairs, student’s academic/personal data, faculty related affairs, classes scheduling etc. Prior to the project implementation IT system existed for the administrative related activities but there was no system for effectively maintaining the activities related to an educational institution and the same were carried out on almost manual basis that sometimes cause data integration problems, therefore the management wanted to develop a standard software package that would help in integrating the different departments activities to operate in an environment where all the departments could easily and efficiently interact with each other on as and when required basis and administration of the same be made effective & efficient to improve the overall organizational performance in general. Also the ever increasing size of physical files were affecting the organizational system’s efficiency and more manpower and resources were required to operate that manual system which was neither fast & reliable nor secure and efficient for the better management. The organizations selected Oracle as software and
purchased only its necessary related tools for in-house development of the ERP system. The developed system was finally followed by its implementation.

3.1.3.3. The proposition: Both IT and ERP planning supported the business planning and processes. IT/IS executives were well aware of the current as well as overall objectives of the organizational business processes and vice versa. The system was developed in-house and was implemented using a big-bang approach. A full-time project manager (IT Director) having experience of both project management and ERP implementation was appointed for the execution of the said project who used to devote almost 90% of his working time towards the project implementation and was relieved of maximum of its significant non-project related activities till the completion of the project in question. This indicates how important the project was to the organization’s top management. As the project manager was already an employee of the parent organization, therefore, he had a sound knowledge of the organizational processes and had full understanding of how the current organizational structure was impacting the corporate reporting requirements. The project manager devised a formal implementation structure by making reasonable deadlines for each module’s completion and organized a balanced team, comprised of users from all functional areas, who worked even for late after normal working hours to meet the deadlines. He was supposed to report to the steering committee that used to meet every three weeks to review the progress to give necessary advices on the project. The ability to focus exclusively on the project and meeting the deadlines or target dates by the implementation team was considered the largest contribution of the steering committee. Users’ resistance certainly was a major challenge. A change management team was organized during the implementation phase who executed the strategy by initiating and conducting several change management programs which include small workshops and power point presentations etc. for creating awareness to convince the employees particularly the system users about the benefits of such systems. The head of organization (Chairman) took keen interest and actively showed his involvement during different phases of the implementation by reviewing the progress after every four weeks. The Chairman facilitated provision of all the possible resources and personally supported and participated for resolving the administrative issues and delays during the project. Departmental heads and system users were involved to participate in meetings prior and during the different implementation phases. Organizational vision and goals particularly regarding the ERP systems implementation was effectively communicated throughout the organization and all the stakeholders were almost aware of the same. No champion was emerged during the project. Because the management thought that the level of competency of IT users in the organization was good enough therefore, neither support from the vendor was obtained nor was any consultant for consultancy purpose contacted. More emphasis were given on conducting appropriate trainings and the same were imparted to the IT personnel and system users, time and then to make the system’s use easy for them. The training included both ERP system and organizational business processes. As the ERP system was developed indigenously therefore, very little customization was made in the software to link the different modules effectively to various business processes of the organization by re-engineering some of the business processes to a certain level. The given training proved so effective that the users easily adapted themselves because of the system’s ease of use and thus became satisfied. The project was completed in 2008 meeting almost all the goals and criteria set by the management. A consolidated system was developed to integrate all the activities of an educational institution right from receiving the online candidates’ applications for data collection purpose to the very last activity of student’s degrees/ transcripts generation. Data was now used to be centrally stored without any redundancy and had increased the accuracy and reliability of the generation of reports through the newly installed system like timely announcement of examination’s results, designing latest curriculum etc. The organizational performance was improved as data sharing between the departments was now very easy as well as reliable and fast due to increase in system’s response having single data repository. Any queries or investigation regarding any record could easily be made in fastest reliable way as compared to the old legacy manual system and making it easier for the top management to take quick and better actions/decisions. The top management acknowledged the successful ERP system implementation behind that organizational change, improvement in efficiency and strengthening of their technical educational wing. The management believed of ERP system that not only gave them an edge over other educational institutions of the country but also had helped to have consistent and timely data sharing among departments for better management of the entire organization.

3.1.3.4. Results: The project was classed successful as it was completed on time and did not overrun the allocated budget. The management goals were satisfactorily met. The organizational impact was higher as it improved various processes and enhanced organizational performance by giving it a competitive advantage over the competitors.
3.1.4 Case 4:

3.1.4.1. The organization/company: TOTAL Parco Pakistan Limited (TPPL), a joint venture between the world’s fourth largest Oil Company (TOTAL S.A) and Pak Arab Refinery Limited (PARCO), the biggest and the most modern refinery in Pakistan, started its operations in 2001. It is a fastest growing oil trading/marketing company and has set up a modern network of state-of-the-art retail stations of International standards all over Pakistan with over 200 retail stations at present. The company has a total of almost 500 people at its manpower’s strength and has annual net revenue of $1.162 million at time of the current study.

3.1.4.2. The Project: The company commenced its ERP implementation project in early quarter of 2004 to seek a better solution to handle its growing operations and to meet the reporting requirements of both the management and system users as the old software system was hardly meeting the significant business requirements particularly the reporting and controlling functions. A mix of different softwares were being used prior the implementation of ERP system for book keeping, invoicing, payroll, human resource processes etc. After a cost-benefit analysis, the management got convinced to go for the adoption and implementation of the system. The company, after involving different Unit’s heads and concerned system’s users, finally selected Sunsystems as their ERP solution and SystemsUnion (later acquired by M/s Infor) as the vendor.

3.1.4.3. The proposition: Planning between business and ERP was kind of reactive in nature where IT mostly reacted to the business plans. A full time project manager with relevant experience in project management and ERP implementation was appointed and made responsible for the project implementation who reported directly to chief executive officer (CEO) of the organization. He knew the business quite well and was one of the most experienced, well respected in the implementation team. Personnel from both IT and business process departments were nominated as team members who were kept involved tactfully among each other as well as across the enterprise throughout during the ERP implementation process by the project manager. The CEO’s involvement including project manager’s appointment and personal support to the team was always there throughout the planning and implementation of the project. He used to review the project’s progress after every two weeks. His role as a facilitator particularly in administrative matters was a source of constant support for the implementation team and to the project manager in particular. As the management was aware of the fact that the nature of the business usually drives the implementation strategy for a company, therefore, a phased-approach strategy was used while implementing the different software modules and every single module was thoroughly tested prior to Go-Live and regular training sessions (including the need based & function based) were carried out so that to help the users understand the system to reduce the resistance against the change. A training department, already existed in the company as a separate unit, was actively engaged in educating the users about various business processes of the company and clarification of the organizational vision/mission/goals/objectives from time to time whereas, the vendor support was also obtained to provide on-job training to the selected full-time company staff who in turn trained the system’s users company-wide during the different phases of implementation process which proved effective in making the system easy to use as it simply became a windows based application that allowed data entry input both through key board and mouse and hence minimized the resistance by making the users satisfied. In addition to that a formal change management strategy was also formulated and approved as well as communicated effectively throughout the organization and was strictly followed during the different implementation stages. A steering committee comprise of departmental heads was constituted to every fortnightly meet under supervision of the CEO to review and discuss the progress to address any issues related to the implementation. The members also helped in motivating the employees particularly the system users by making them aware of the benefits associated with the new ERP system and also communicating its effectiveness to their department’s subordinates there and then. The company did not feel hiring of any consultant at any stage of the implementation process because of the sufficient competency of IT users as well as the implementation team. No champion was emerged during the project. As the ERP system was carefully chosen to best fit according to the existing business processes therefore, very little customization in the software, like simplification of data entry forms to make them properly structured for accurate data entry to better meet the requirements of both the management and users, was made to adjust some of the module to the existing system. The current business processes were also tweaked to an extent to get the maximum output from the new system. The project was accomplished in last quarter of the same year in which it was initiated.
3.1.4.4. Results: The project was classed as successful because it was completed on time as well as on/under budget and making a positive impact on enterprise as a whole. It improved the overall operations in terms of efficiency by having accurate and reliable data, which was based on real-time inputs for better reporting, controlling and decisions making purposes etc., particularly for the company’s top management. Quality of the reports being generated was far better as compared to the old prevailing system for reconciliation and reviewing purpose and it became a matter of clicking just a combination of few keys only. The management was of the view that the implementation of the new ERP system really changed the overall organizational efficiency and performance by standardizing their various business processes and brought up improvements in customer service, customer attraction, timely completion of the operational related tasks, effective collaboration among departments and data integration with more accuracy & transparency and hence enabled the company to keep up smoothly with the competitive environment in the industry.

4. Discussion

- P1: The first proposition states that selection of a right full time project manager with extensive experience whose sole responsibilities are the project is positively related to the successful implementation of ERP project. The successful cases support P1. The organizations like IST, SUPARCO (SITT) and TPPL appointed project managers on full-time basis and were successful in terms of completing their projects on time and within the allocated budget along with having high organizational impact. Whereas the project manager at Shahkar Engineering & Co. devoted 70% of his working time to the project because of his other significant non-project responsibilities within the enterprise and experienced problems with on time and on budget performance and thus suffered both time and cost overruns in the end, which also led to failure in improving organizational performance.

- P2: Cases studied in the research does not support the second proposition that reporting level of the project manager that is an organizational structure in which the project manager directly reports to the business division’s senior management leads to implementation project success. In all cases the project manager was supposed to report to almost different personnel in the enterprises for example; to Vice Chancellor, member of top management team, steering committee and CEO in IST, Shahkar Engineering & Co., SUPARCO (SITT) and TPPL respectively. Therefore, the project manager’s reporting level does not positively or negatively affect a project success.

- P3: The third proposition is that the quality (adequacy) and quantity of training and education of personnel/users are positively related to successful implementation of ERP project. The cases support P3 because in all of the successful cases, trainings were adequately given in a sense that it comprised of both learning of business processes and ERP system. In one unsuccessful case, the training was imparted but was not adequate as it included learning of the system only which resulted in failure of gaining the users’ acceptance/satisfaction and hence led to the project implementation failure.

- P4: It states that presence/existence of a champion in implementation of an ERP project leads to successful implementation of ERP project which is not supported as there emerged or existed no champion in either of the cases. Therefore, this factor as published in the past literature does not have any impact on project implementation success.

- P5: The fifth proposition is that the role and effectiveness of management in reducing the resistance to change among system’s users in an organization is positively related to implementation project success is true as it is supported in the successful cases studied in this research. The management was quite effective at IST, SITT and TPPL as compared to Shahkar Engineering & Co., which suffered such a high resistance that they were unable to implement the already purchased modules, which caused the enterprise to suffer with financial loss.

- P6: It posits that use of Steering Committee for monitoring and controlling is positively related to successful ERP implementation. No relationship existed between the presence of steering committee and the project success as it existed in all of the successful and unsuccessful cases. Its presence for control purpose may be necessary but it does not guarantee to the project implementation success.

- P7: It states that the level of Integration of business planning with ERP planning is positively related to implementation project success. The cases do not support P7. In all the organizations
studied here both IT/IS planning and business planning were either supportive or reactive and no integration was observed at the beginning of the ERP project. However, after completion of the project the integration between both business and IT planning was developed.

- **P8:** It postulates that use and role of consultants for guidance and support in an ERP project is positively related to successful ERP implementation. The cases do not support P8. As in all the successful cases no consultant was hired. The consultant was hired in case of the unsuccessful firm but it did not lead to project implementation success. However, as the ERP system implemented in two of the successful case studies was developed in-house therefore, those organizations might not need any consultancy services for guidance or support purpose. However, in case of TPPL, although the system was not developed in-house but due to sufficient competency of the IT personnel involved, the management did not go for any consultancy either and still the implementation was successful.

- **P9:** It states that the top management support/involvement in the planning and implementation of ERP systems leads to implementation project success. The cases support P9. In all the successful cases the top management actively participated by taking keen interest in the activities happening in the enterprise by resolving the outstanding issues & unnecessarily delays and played a significant role of more than just approving the project as well as the financial budget associated with it. The top management involvement and periodically reviewing the progress was often interpreted as an indicator of the importance of the project to the organization, which was lacking in case of unsuccessful enterprise studied in this research.

- **P10:** This proposition posits that level of competency in use of IT and availability of an appropriate IT infrastructure is positively related to ERP implementation success. But in all the cases studied no relationship existed between the level of competency of IT users and IT infrastructure with the project implementation success. As in all the enterprises the IT department was in fair enough condition but still in one of the cases the ERP project implementation got failed. This factor might be necessary but it did not favorably or unfavorably impact the project success.

- **P11:** This proposition states that clearly specified goals/objectives/scope of ERP project to the organizational members particularly to the system users leads to ERP implementation success. All the case studies support P12. Only in one case where the project implementation went unsuccessful the same were not effectively communicated and hence the employees were dubious about the ERP system’s potential benefits, scope/applicability and objectives.

- **P12:** This proposition posits that a certain level of business process re-engineering and minimal customization to fit into the current processes of the organization is positively related to ERP implementation success. Case studies support this proposition. In IST and SITT as the ERP system was indigenously developed so minimal customization was made with a certain level of re-engineering in the existing business processes and so in the case of TPPL, which purchased the ERP system from the vendor. Whereas, in case of Shahkar Engineering & Co. radical customization in the selected software was made to fit it according to the organizational needs and processes which were more time consuming and the project suffered overruns in terms of both time and cost.

- **P13:** The fourteenth proposition which is about the involvement of organizational members/users in adoption and implementation of ERP is positively related to ERP implementation success was proved true in all the case studies as the management in the successful cases of ERP implementation involved the department managers and the system users before selection and going on live for ERP system. Therefore, this proposition is supported.

- **P14:** It states that ease of system’s use and thus user acceptance is positively related to ERP implementation success. The cases support the proposition as the training provided in successful cases proved so effective that it made the use of system easy and thus generating satisfaction among the users, which led to the successful implementation of the project.

- **P15:** The statement that the selection of a suitable vendor for the support purpose leads to the ERP project implementation success, does not necessarily guarantee the successful implementation as in only one successful case studies i.e., TPPL seek support from the vendor whereas, in rest of the
organization’s success stories no such support from the oracle software provider was obtained. Shahkar Engineering & Co. also got vendor’s guidance for adjustment of certain software module but the project as a whole went unsuccessful at the end.

- P17: It posits that effective project management skills to plan, coordinate and monitor the implementation activities related to ERP systems is positively related to ERP implementation success. But no relationship exist between the project management skills and ERP project implementation success as the project manager appointed in case of unsuccessful firm had got 10 years of project management experience on the basis of which the company did not appoint a manager in separate capacity to execute the project. Project management may be necessary but the cases conclude that it does not necessarily guarantee the ERP project success. Therefore, P17 is not supported by the cases studied in this paper.

- P18: It postulates that effective as well as clear communication among the organizational members at all levels before and during the implementation phases is positively related to ERP implementation success. This is strongly supported as the management in successful case studies was well aware of this factor and it was accorded priority. However, the level of communication was not such to be appreciated in the case which was classed as unsuccessful in the study in question. Therefore, P18 is supported by the case studies.

- P19: It states that selecting and developing a suitable ERP strategy and implementation methodology leads to ERP implementation success. But no such relationship exist with the ERP project implementation success because the approaches like phased and big-bang were used in the case studies for implementation of different modules but in one case, Shahkar Engineering & Co., that used phased-approach did not lead to a project success. Therefore, P19 is not supported.

- P20: It states a balanced team for ERP implementation particularly comprised of both business planning and IT personnel is positively related to ERP implementation success, which is strongly supported as in all the successful cases, representatives from both business and IT were nominated to constitute a balanced team under the supervision of a full time project manager, which led to a successful ERP project implementation.

5. Research limitations and conclusion

Like any research, our study and approach also have some limitations. As findings and results of this research are obtained by qualitatively analyzing the data obtained from a small sample of just four organizations, which is a noticeable limitation and therefore may be a lesser representative of organizations within Pakistan. Readers should be cautious in interpreting the results of this study. Indeed, selection of a specific set of only four enterprises, for testing of the developed propositions by using a multiple case study approach, to narrow the research context to base the study on, can limit the generalizability of the findings. It is, therefore, proposed that the scope may be enhanced by including more organizations from different sectors of the economy and quantitative techniques may also be used and applied for more in-depth analysis. The findings then should be combined in future to give a more comprehensive and consolidated view to contribute to the existing literature so that the results would appear more beneficial for the enterprises, which are planning to adopt and implementing the ERP systems. Due care may also be taken in understanding the findings because results of the current research are based on the survey conducted in medium- and large-sized enterprises therefore, the results may be different if the identified and proposed CSFs are applied on the small-sized enterprises whose constraints and objectives as far as the adoption and implementation of information systems is concerned, like ERP in our case, may be different from the large and medium scale enterprises (Laukkanen et al., 2005). Upadhyay et al. (2010) also argued some significant issues that are critical for Small & Medium Enterprises (SMEs) but are not critical for the large scale enterprises. Also Huin (2004) found that for positive outcomes or benefits to be obtained from adopting and implementing the ERP system’s projects, the significant differences regarding critical success factors between the enterprises of large sized and small & medium sized need to be clearly identified and defined first. Therefore, it is also recommended to include small scale enterprises for future research to get a clearer picture of the phenomena in question. For future research, it is also suggested to test the propositions, developed in the current study, in context of other developing country(ies) and then the findings may be compared to find the significant differences for obtaining a more comprehensive picture and better understanding of the scenario.

Our research started with a thorough examination of the literature published in past in the context of different countries regarding the most CSFs in the ERP implementation and our aim was to examine
which of the selected factors were and were not practically considered by the organizations in developing countries like Pakistan, while going for the ERP implementation for the better management of the entire enterprise. Although some of the identified factors may or may not be equally important to different countries, however some proposition were developed and subsequently tested. The research concludes that:

Firstly, selection of a right full time project manager, quality(adequacy) & quantity of training, role and effectiveness of management in reducing the users’ resistance, top management support/ involvement, change management culture and programs, clearly specified goals/objectives/scope of ERP project, business process re-engineering / minimal customization, involvement of organizational members/users in adoption and implementation of ERP, ease of system’s use & users’ acceptance, effective communication among the organizational members and a balanced team for ERP implementation are practically used and considered by the successful enterprises while planning and going for the implementation of the ERP system as compared to the unsuccessful ones in which lower consideration is given to the same. Secondly, some of the factors considered imperative for success in the past scholarly work like reporting level of the project manager, use of steering committee for control purpose, competency in use of IT and IT infrastructure, vendor’s support, project management, ERP strategy & implementation methodology although necessary but solely relying on those may not favorably or unfavorably leads and thus not sufficiently guarantee the ERP project implementation success. Thirdly, some managerial based issues that were supported in the past literature like level of integration of business planning with ERP planning, presence/existence of a champion and role of consultant are not supported in the case studies in this research. Hence the findings of our research contribute to the existing body of knowledge regarding the critical factors for ERP system implementation success. Organizations particularly the personnel or team(s) responsible for the execution of such projects as well as the vendors and the academician who study them can be benefited from the findings by becoming more aware of the critical factors for successful ERP implementation.

It was also observed that ERP had brought a favorable impact on the entire organizations that adopted and implemented the ERP systems projects successfully and helped greatly in better management of the enterprise in managing different issues such as seeking improvement in operational efficiency & management control, cost reduction, achieving and sustaining competitiveness by becoming more flexible and hence adaptable to the rapid changes in the marketplace, effective integration of data, accuracy & reliability of information for better decision makings, standardization of business processes, enhancing the scope of integration by acquiring integration capabilities both within and outside the enterprise, reporting quality, customers service satisfaction etc., to name some of few.

It is finally suggested that the specialized training for the world renowned standard ERP application packages is needed to be started at the mass level on low cost basis by educational institutions/universities by establishing ERP centers in collaboration with leading ERP providers in a developing country like Pakistan as the ERP application systems give more efficiency and competitive advantages to the organizations and has numerous benefits if implemented successfully and tactfully. The government should also support these training initiatives and give more grants to those educational institutions that want to establish ERP centers for improvement and effective management of the enterprises.
References:


S. Al-Sehali, 2000. The factors that affect the implementation of enterprise resource planning (ERP) in the international Arab Gulf States and United States companies with special emphasis on SAP software. *(Saudi Arabia),University of Northern Iowa*.


Appendix A

Questionnaire for preparing the case study

1. Please specify whether your firm/company/organization is engaged in which of the following sectors of the industry/economy?
   □ Manufacturing   □ Service   □ Educational   □ Others

2. Is your firm/company/organization a:
   □ State-owned enterprise   □ Privately-owned enterprise   □ Foreign-owned subsidiary
   □ Semi Government   □ Joint Venture

3. What is the nature of products/services, more precisely the main business functions of your firm/company/organization? (Please describe it very briefly)

4. When was your firm/company/organization founded or established? (Please specify the month, if possible)

5. At present what is the total manpower strength working in your firm/company/organization?
   □ 50-150   □ 151-500   □ 501-1000   □ 1001-2000   □ Above 2000   □ Above 5000

6. How much is the total sales/revenues (in million US$) of your firm/company/organization?
   □ 1-5   □ 5-10   □ 10-20   □ Above 20   □ Other (please specify)

7. Was there any IT infrastructure already existed prior the management’s decision of going for the ERP system implementation in your firm/company/organization?
   □ Yes   □ No and almost all the processes were manually executed
   If yes, kindly describe the condition/status of the same as whether it was:
   □ Very good   □ Good   □ Normal   □ Bad   □ Worst

8. How competent were the system users particularly the IT users i.e., what was the level of their competencies?
   □ Outstanding   □ Excellent   □ Good   □ Fair enough/normal   □ Bad

9. What was the name of the Software’s Vendor that your top management selected for purchasing of the ERP system?

10. What ERP system’s solution package your firm/company/organization opted for?
   □ mySAP   □ Oracle’s JD Edwards   □ Oracle’s EBS   □ Sunsystem   □ Microsoft dynamics   □ Any other, Please specify

11. Was the vendor competent enough (in terms of having knowledgeable staff) and supported in the project implementation by providing proper guidance and services?
   □ Yes   □ No
   And how did the vendor contribute to the project?

12. In which year your firm/company/organization started the ERP project implementation (please provide the exact month also, If possible)?

13. Why the management felt the need for adopting and implementing the ERP system in your firm/company/organization i.e., what was the actual goal behind its implementation? (You may tick all that applicable)
   □ Improvement in customer service/attraction   □ Operational efficiency   □ Cost reduction
   □ Effective data Integration   □ Service quality improvements   □ Increase in Sales   □ Process improvement   □ Others, please specify

14. Please describe whether the management’s vision/mission/goals/objectives and decisions particularly regarding the ERP system was clearly communicated and known to the concerned users/employees?
   □ Yes   □ No
15. How was the nature of communication in your firm/company/organization?
   □ Good and effective □ Good but ineffective □ Normal □ Bad and ineffective
   Also how would you describe the same as to whether it was?
   □ From top to bottom □ From bottom to top □ Horizontal

16. Were the system users and other concerned manager/employees got involved while selection/adoption of the ERP systems as well as in its implementation before going on live with the ERP systems?
   □ Yes □ No □ Any other, please specify

17. Was there any project management strategy devised as well as followed prior and during implementation?
   □ Yes □ No

18. How was the ERP software modules implemented i.e., whether the approach used was?
   □ Big-bang approach (i.e., Implemented as a whole) □ Incremental approach (single-module/phased approach) □ Both of the above mentioned approaches □ Any other, please specify

19. What criteria the management decided for measurement of the project implementation success completion before the project actually started/executed? (Please encircle whichever is applicable)
   (a) On time (b) Under/within budge (c) Overall organizational impact (d) Combination of a & b (e) Combination of a & c (f) Combination of b & c (g) Combination of a, b & c (h) None of these (j) Any other, please specify

20. Was the ERP project completed:
   □ As partially □ In full

21. In which year it was completed (kindly specify the month also, if possible)?

22. In the end whether the project was classed as:
   □ Successful □ Unsuccessful

23. With the implementation of ERP whether the corporate predetermined goals/objectives:
   □ Partially met □ Fully met □ Any other, please specify

24. If your firm/company/organization belongs to a manufacturing sector then:
   a) Whether any improvement in the inventory turnover noticed? □ Yes □ No
   b) Whether any improvement in the on time delivery noticed? □ Yes □ No
   c) Whether it reduced the delivery lead times? □ Yes □ No
   d) Did the ERP project affect the system response time? □ Yes □ No
   e) Did it impact the accuracy and reliability of data as well as its timely availability for different management decisions? □ Yes □ No
   f) Whether reduction in cost observed? □ Yes □ No

If your firm/company/organization is working in service sector then:
   a) Did any improvement in the system’s response time witnessed? □ Yes □ No
   b) Did it impact the accuracy and reliability of data as well as its timely availability for different management decisions? □ Yes □ No
   c) Did customer service quality improve and more customers were attracted? □ Yes □ No
   d) Did the system affect both the internal and external operational processes? □ Yes □ No

25. Was the ERP system selected for implementation in your firm/company/organization assessed in terms of “ease to use”? □ Yes □ No
If yes, whether employees particularly the system users were:
   □ Well-satisfied □ Satisfied □ Partially satisfied □ Not satisfied at all
26. What influence did the ERP system make on overall quality (i.e., precision, accuracy and appropriateness etc.) of reports as compared to the ones used to be prepared through the older prevailing legacy systems?
   - □ Great influence  □ Normal Influence  □ Partial influence  □ No influence at all

27. Whether implementation of ERP system really changed the overall organizational performance in terms of: (Please tick whichever is applicable)
   - □ Improvement in production planning/scheduling  □ Customer service/customer attraction
   - □ Cost reduction  □ Data integration/maintenance/transparency  □ Business process standardization  □ Shortening time in product development  □ Any other improvement(s), please specify

28. Did the ERP systems helped in the management and controlling of collaborative activities of the whole enterprise? □ Yes  □ No

29. Had the ERP implementation project in your firm/company/organization completed on time i.e., within the scheduled time? □ Yes  □ No
   And whether specified deadlines to meet the project’s completion were: □ Reasonable  □ Unreasonable

30. Did the ERP implementation project in your firm/company/organization completed on/under budget?
   - □ Yes  □ No
   If no, will you kindly specify the reason?

31. How would you describe the relationship between business process planning and information system planning in your firm/company/organization?
   - □ Completely integrated  □ Partially integrated  □ Reactive  □ Aligned to each other
   □ Any other, please specify

32. Did the IT/IS executives well aware of the current as well as overall objectives of the organizational business and vice versa or was there any confusion existed regarding those?
   - □ Yes and no confusion existed among them  □ No and confusion existed among them

33. Was any project manager selected/appointed and made responsible for the formal implementation of ERP project?
   - □ Yes  □ No

34. How much was the project manager’s following experiences (in years)?
   - (a) Total working experience □ (b) Project management experience □ (c) ERP system implementation experience □

35. Was the project manager a full time manager? □ Yes  □ No
   And how much of his working time he used to devote to the ERP project implementation?
   10-20% □ 21-40% □ 41-60% □ 61-80% □ 81-100% □ Any other □

36. Whether the project manager was supposed to directly report to:
   - □ Senior manager of a business unit  □ Senior manager of a department  □ Organizational head/chief  □ Steering Committee  □ Any other, please specify

37. Whether the ERP project’s implementation team in your firm/company/organization comprised of?
   - □ Only IT personnel  □ Only business personnel  □ Combination of both IT and business personnel
   And also in your opinion, was the team balanced? □ Yes  □ No
38. Was there any training/education arranged and given to the concerned users, particularly to the system users? □Yes □No
   If yes, then whether it was given:
   □Prior the project implementation □During project implementation □Combination of both

39. How frequently were those training/education sessions organized?
   □On as and when required basis □After every one week □After every two weeks □Once in a month □Any other, please specify
   And whether the training being conducted was?
   □Adequate □Inadequate □Any other, please specify

40. Was that training focused only on:
   □Learning of ERP system only □Learning of business processes/objectives only
   □Combination of both these mentioned
   And also whether the quality of training provided:
   □Outstanding □Good □Above average □Below average □Bad

41. Was any consultant for guidance purpose selected for and deployed on the ERP project implementation?
   □Yes □No
   If yes, what significant role had the consultant played during the implementation? (Please specify very briefly)

42. What was the level of involvement or participation of the top management (Chairman/President/CEO/GM)?
   □Fully involved/committed □Partially involved □Involvement specific to only budget approving/allocating □No involvement at all □Any other, please specify

43. How frequently did the top management review progress regarding the project being undertaken?
   □On as and when required basis □After every one week □After every two weeks □Once in a month □Any other, please specify

44. Was any champion present or emerged to guide and motivate the users/employees of the ERP project’s benefits in general and to the implementation team members in particular? □Yes □No
   If yes, what significant role he/she played in its implementation? (Please specify in brief)

45. Did the management aware of the user resistance, it may face when introducing the new ERP system?
   □Yes □No
   If yes, whether the management efforts in reducing that resistance against the change were?
   □Highly effective □Effective □Ineffective

46. Was any steering committee formally constituted for the control/guidance purpose during ERP implementation?
   □Yes □No
   If yes, how frequently did the committee use to meet to discuss the progress?
   □On as and when required basis □After every one week □After every two weeks □Once in a month □Any other, please specify

47. Was the role or function of the steering committee during the project implementation?
   □Highly effective and motivational □Effective □Ineffective
   And whether the committee headed by:
   □Chairman □President □CEO □GM □Any other head, please specify

48. Please describe that during and after implementation of the ERP project, whether it helped your firm/company/organization in achieving as well as sustaining the competitive advantage over
49. Was any specific change management strategy devised and communicated prior to the ERP project implementation?
   □ Yes  □ No

50. In the past how proficient was your firm/company/organization to changes?
   □ Highly proficient  □ Proficient enough  □ Not proficient at all  □ Other, please specify

51. How fit was the selected ERP software package to the current organizational business processes?
   □ Absolutely fit  □ Normally fit  □ Not fit at all  □ Other, please specify

52. Upto which level re-engineering in the existing business processes occurred to fit the organization to the new ERP software?
   □ Maximal level  □ Minimal/certain level  □ No changes at all

53. What was the level of customization made in the ERP software to best suit/fit to the need of your firm/company/organization?
   □ Minimal/incremental  □ Radical/fundamental  □ Not configured at all

54. Please specify very briefly, what are your current major job functions or responsibilities in your firm/company/organization?
   □ Minimal/incremental  □ Radical/fundamental  □ Not configured at all

55. Have you ever been engaged or participated in ERP project implementation?
   □ Yes  □ No
   If yes, how much experience in total (in years) have you got in ERP project management/implementation?
   □ Up to five  □ Up to eight  □ Up to ten  □ More than ten  □ Others, Please specify

56. Simply on a scale of 5-point how would you describe the agreement and importance of the following critical success factors that the researcher has identified and wanted to examine that may relate to the successful implementation of the ERP project in the organization?

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Critical Success Factor</th>
<th>Agreement/Disagreement</th>
<th>Importance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Selection of a right full time project manager with extensive experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Quality (adequacy) and quantity of training and education of personnel/users</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Presence/Existence of a Champion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Use and role of Consultants</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Role and effectiveness of management in reducing the users’ resistance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Use of Steering Committee for control purpose</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Integration of Business Planning with ERP planning</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Reporting level of the Project Manager</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Top management support/ involvement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Change management strategy and programs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Competency in use of IT and IT infrastructure</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Clearly specified goals/objectives/scope</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Business Process Re-engineering (BPR)/ Customization</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Involvement of organizational members/users in selection of ERP</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Ease of System’s use and users’ acceptance.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Vendor’s Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Project Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>Effective communication</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>ERP strategy and implementation methodology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>A balanced team for ERP implementation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Completion of the project on time/within scheduled time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>Completion of the project under budget/within allocated budget</td>
<td></td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>Project would be categorized as successful only if it affects the improvement in organizational performance</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>