

AN ANALYSIS OF THE CHALLENGES AND BARRIERS OF IMPLEMENTING ERP IN LISTED COMPANIES OF COLOMBO STOCK MARKET

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Abstract

Background In today's context implementation of Enterprise planning System has been a latest trend among the organizations in Sri Lanka. Through a successfully implemented and properly executed system, companies would be able to generate smart data and would enable them in drafting effective strategies to withstand the changes in market. In order to withstand the benefits from the usage of enterprise resource planning system, the implementation phase and the related activities play a crucial role. Further it has witnessed several companies' activities fails due to inappropriate implementation of such systems and incapability of serving the Critical Success Factors for the implementation of such systems. In has been witnessed that several listed companies in Sri Lanka has already adopted Enterprise Resource Planning systems and through this study expects to identify the challenges faced by them in adopting such system.

Data collected through interviews and questionnaire as primary data source and literature review used as a secondary data source. Interviews had been conducted with selected sector wise public listed companies and collected among the participants via questionnaire. These data will be analyzed using Statistical Package for Social Scientists. For study, Exploratory mixed method research design will be used. Further likert scale questions, closed ended questions and open-ended questions included in the questionnaires.

Discussion and Conclusion Through the existing literature survey found that corporate bodies face many challenges in implementation of Enterprise Resource Planning. Identifying the common issues faced by different sectorial organization is important for the potential users of Enterprise Resource Planning. Even though there are many literatures exist in relation to foreign context, observed a lack in literatures in relation to Sri Lankan context. Through this study the gap being full filled by identifying and understanding the challenges faced by the Sri Lankan Listed entities.

Key Words: Enterprise Resource Planning System, Challenges and Barriers, Public Listed Companies

1. Introduction

Over the past few years, many organizations have implemented Enterprise Resource Planning (the “ERP”) systems to increase the efficiency of the business processes. The complexity of detached accounting packages and systems rapidly increased the need for an integrated business process system. Maguire’s observations in 2010 (cited in Maruf 2011) states that, ERP as one of the system which ensures all operational systems of the company to be fully integrated. The integration of systems enables employees to access the real-time information. The integration of systems improves decision-making processes, planning and control within companies through provision of timely information. In achieving the organization goals and objectives, ERP system contributes through providing support to business processes. Regardless of the industry in which organization operates, ERP facilitates the operations of firm to be carried out in efficient way.

Under the dynamic technological environment, Information System (IS) is considered as an important challenge for the companies in Sri Lanka. Even though there are many benefits in ERP system many companies have faced some downsides in implementation stage due to different myopia within the organization. Therefore, there is a need for an additional and more qualitative analysis to establish firmly among the different technology and concepts. A recent review of the literature on this topic, Maruf (2011, p. 133) in reporting Sharif et al, 2005 reveals that; [t]he ERP attempts to integrate as many business functions and applications as possible. The technologies are developed to address the fragmentation of information across an organization’s business and to intra- and inter-enterprise information. The objective of this study is to identify the barriers and challenges in implementing ERP system in selected public listed companies and providing

solutions to potential ERP system implementers. The challenges and barriers will be addressed under Four (4) stages including pre-implementation stage, at the time of implementation, immediate after implementation and post implementation stage. This study may improve the knowledge of employees, society, students and other potential users of ERP. The next section of this paper traces the various scholars' findings on ERP implementation. It provides the benefits and downsides of the ERP system implementation in the business process. To provide the rationale for this study the interviews and questionnaires will be used as primary source of data.

Problem Statement

It has been stated that in order to implement and gain benefits from Enterprise Planning System (ERP) organizations struggle a lot (Momoh et al. 2010, p.541). Sri Lankan organizations being in the initial stages of implementation of ERP system also experienced various challenges and identified various critical success factors which minimize the challenges faced by the organizations in implementing the system. In order to have a good ERP system and to sustain benefits implementation stage plays a crucial role.

Elisabeth et al. 2003, has identified several critical factors for successful implementation of ERP as; clear understanding of strategic goals, commitment by top management, excellent project management, organizational change management, availability of great implementation team, availability of accurate data, provision of extensive education and training, focused performance measures and multi-site implementation issues. Proper management of such critical success factors would lead organization for the successful implementation and would enable organization to achieve competitive position in market. Factors lead to those failures included: poor governance, lack of transparency and frauds. Further Momoh et al. 2010, has identified following as factors leading for the failure of implementation of ERP; limited training, lack of change management, excessive customization, dilemma of internal integration, poor understanding of business implications & requirements, poor data quality, lack of top management support, hidden cost and misalignment of IT with business.

In world context handful of researches has been conducted in order to identify the challenges faced in implementing ERP, identifying Critical Success Factors (CSF) and identifying Critical Failure Factors (CFF) but found a deficit in such literatures in relation to Sri Lankan context and a gap

been found which being the key initiative beyond the research. Further through such research the Sri Lankan organizations which are in process of post implantation phase could identify relevant CSF, CFF & would enable them to implement ERP successfully.

In addition, existing theories in relation to implementation of ERP doesn't cover a wide range of CFFs and through this research would enable to understand the reasons for the failures of implementation and would trigger the alterations in such evading theories. The key to success of implementation of ERP rests in identifying the reason beyond their CFFs and making required modifications & alterations to attain the obligatory objective.

According to the insights given by problem statement, our study will receive an insight from management of the organization, implementation team, developers of ERP systems and relevant ERP system consultants. Accordingly following have been identified as the specific research questions of the study

Research Questions and Research Objectives

Research Questions the research attempts to address the following questions.

1. Identify the existing practice of integrated systems in current Sri Lankan business context?
2. What are the critical success and failure factors affecting to the implementation of ERP system in Public listed entities?
3. What challenges and barriers faced by Public listed entities in implementation of ERP system?
4. How companies mitigate these barriers in different stages in implementation of ERP system?

Overall Objective

To analyze the challenges and barriers of implementing ERP System in Listed companies of Colombo Stock Market.

Specific Aims

I. To identify the Challenges and barriers faced by the listed companies in Implementing ERP System.

1. Pre-Implementation Stage

- Why companies have decided to introduce an ERP System?
- Common challenges faced in the pre-implementation process

2. Implementation Stage

- Forward - Common challenges in Implementation process

3. Post Implementation Stage

- Challenges faced in Post Implementation process

II. To identify the Methodologies followed by listed companies to overcome challenges and Barriers.

III. To analyze the value addition for different stakeholders by overcoming the challenges and barriers in implementing ERP in listed companies.

Significance of the Study

ERP implementation is rapidly catching the world. It is realized that the reasons are the advantages and results of the ERP systems.

This deviation from the conventional practice has become the trend of the era as many companies are concerned about ERP system implementation. Therefore this motivation is playing an essential role in terms of implementation. Hence it is very important that the Companies' understanding about what enterprise resource is planning and what are the challenges faced by the already implemented pioneer companies before thinking of implementing them.

Sadra Ahmadion (2015, p.501) ERP implementation concluded that; [a]ny organization which plans to introduce a new enterprise resource planning (ERP) system will carry out a range of activities to improve its readiness for the new system. Since the lack of existing guidelines for the

ERP system implementation in the Sri Lankan context, this study will be a useful guide for the companies who is planning to implement ERP system in the future. However in the global context, Jiwat Ram (2013, p.157) stated that [w]e question whether some factors labeled as ‘critical’ success factors for ERP projects are in practice actually critical for achieving success in implementation and improving output performance. To examine this we report an empirical study that has investigated whether four major CSFs are in practice critical for achieving organizational performance improvements, and the role that successful implementation may play in influencing the relationship between CSFs and improvements in organizational performance. Further, this study will be a useful resource not only for the companies but also for the students who are interested in these academicians, the researchers who are looking for the unexplored gaps related to this particular subject, business information system developers, programmers and the society at large.

2. Literature Review

Introduction

Literature review helps researchers to find the current knowledge including substantive findings to theoretical and methodological approaches to a particular study. The objective of the study is to analyze the challenges and barriers of implementing Enterprise resource planning (ERP) in listed companies of Colombo Stock Market. Several studies have been carried out in the area of Enterprise resource planning system in various countries around the world.

Charlambos Spathis (2006, p. 32) summarizes the effects of ERP implementation,

[t]he emergence of enterprise systems (ES) or ERP systems has [sic] signified the start of a new era in the business environment, where companies can now integrate business applications and respond to real-time information. One may argue that in this highly automated, IT-led business environment, companies are forced to keep up-to-date with the new technologies in order to remain competitive.

Concepts and Definitions - ERP

ERP systems are integrated, all-encompassing, complex mega packages designed to support key functional areas of organizations (Adam and Sammon, 2004 cited in Simona, Miro & Samo 2011). They integrate information from various sources inside and outside the organization and can provide real-time data to employees and organizational partners (Motiwalla and Thompson, 2009). ERP solutions have been adopted by many large organizations (Momoh et al., 2010) and are a basic tool for enterprises seeking to merge supply chain management systems and integrate inter-company and international collaborative operations across entire industry processes (Yu, 2005 cited in Guo, CP & Miguel, BN 2009).

ERP systems are business software packages that enable organizations to integrate their business functions such as sales, production, human resources, finances, purchasing and etc., share common data, information and knowledge throughout the entire enterprise, automate critical parts of its business processes and generate and access information in real-time environment using a single database (Kohetal.,2011).

ERP systems can bring substantial value for the firm through best business practices, delivered through various functional applications supported by comprehensive process and data integration (Kohetal, 2011).

ERP Implementation Process

ERP system is based on the concept of identifying and implementing the set of best practices, procedures and tools that different functions of a company can utilize to accomplish total organizational excellence through integration. (Maruf Hasan Nga T. Trinh Felix T.S. Chan Hing Kai Chan Sai Ho Chung, (2011).

As per, Beatty and Williams, 2006) ERP is probably the most important IT-enabled innovations in the last decade.

ERP attempts to integrate as many business functions and applications as possible. The technologies are developed to address the fragmentation of information across an organization's business and to intra- and inter-enterprise information (Sharif et al., 2005).

The implementation and adoption of ERP systems across many industries and organizations have resulted in both failures and successes. Thus, there seems to be a strong need for enhancing current implementation practices for better outcomes. There is a strong need for enhancing the effectiveness of ERP projects while being fully aware of problems, shortcomings and their resolutions (Abdinnour-Helm et al, 2003).

In recent times, implementing Enterprise Resource Planning (ERP) systems has become a trend across the globe and organizations are investing vast resources on it. ERP implementations are associated with a promise of benefits from automation and integration but they also carry the risk of failure. (Madhavi Latha Nandi Ajith Kumar, (2016)

Critical success/ failure factor analysis

ERP system typically follows three lifecycle phases: selection, implementation and operation, the latter of which can be divided into a stabilization stage and a routine stage (Simona, Miro & Samo 2011).

Studies (Simona, Miro & Samo 2011) stated that literatures less effort is given to identifying potential post-implementation impact. Studies (Simona, Miro & Samo 2011) identified the critical successful factors (CSFs) affecting ERP selection and implementation as top management support and involvement; clear goals, objectives, scope and planning; project team competence and organization; user training and education; business process reengineering; change management; effective communication; project management; user involvement; data analysis and conversion; consultants; project sponsor; architecture choice; and minimal customization. The studies (Gattiker and Goodhue, 2005 cited in Simona, Miro & Samo 2011) stated that CSFs are not equally important in all phases of the ERP life cycle; however some influence operational effectiveness as well as implementation.

Organizations face similar challenges in implementing ERP systems irrespective of whether it is a total ERP system or selected modules of an ERP system. Most challenges to ERP implementation involve managing personnel and their reactions to change rather than managing technical issues. A pre-implementation roadmap is identified as a key element for eliminating many causes of failure including lack of organizations' readiness for ERP.

From the literature found the following factors as key to success of implementation of ERP (Madhavi Latha Nandi Ajith Kumar, (2016),"Centralization and the success of ERP implementation"

Table 1: Analysis of Critical success factors

<i>Category</i>	<i>Success Factor</i>	<i>Contributing Literature</i>
Top Management Support	Use of steering committee comprising of top management	Legare 2002; Somers and Nelson 2001
	Effort orchestration of multiple change leaders	Martin and Huq 2007
	Commitment to financial and technological resources	Dong 2001; Somers and Nelson 2001

Change Management	Top management communication on ERP system benefits	Kansal 2007; Zabjeck et al. 2009; Somers and Nelson 2001
	Inter-departmental communication	Akkermans and Helden 2002; Zabjek et al. 2009; Somers and Nelson 2001
	Clarity on goals and objectives of ERP implementation	Kansal 2007
	Organizational consensus	Bradford and Florin 2003; Gargeya and Brady 2005
	User Training	Somers and Nelson 2001
	Organizational readiness to change	Bosilj-Vuksic and Spremic 2005; Gargeya and Brady 2005; Motwani et al. 2002
Conflict Management	Differences in political agendas of dominant groups inside the organization	Boersma and Kingma 2005
	Management approach to resolve Conflicts	Ward et al. 2005
ERP knowledge Internalization	Organization's learning Capabilities	Lee and Lee 2000; Wang et al. 2007; Sedera and Gable 2010

ERP implementation in Sri Lankan Context Analysis

ERP System researches in Sri Lankan context in recent years there has been an increase in using Enterprise Resource Planning (ERP) systems in large companies and government corporations mainly in developed countries. While there is wide adoption of ERP systems in Western economies, developing countries lag far behind (Otieno, 2010). However, due to recent economic growth, developing countries such as Sri Lanka are increasingly becoming major targets of ERP vendors. Although only fewer numbers of companies in Sri Lanka, especially multinational companies have implemented ERP systems to gain a strategic competitive advantage (Fernando, 2004).

Furthermore, Fernando (2004) mentioned in his study, since Sri Lanka is a developing country most of Sri Lankan organizations do not have strength to go for ERP solutions. Even if a very few companies do so, unlike in foreign countries, the amount they spend for ERP is a significant amount (very high percentage) of their total income. Undoubtedly it is a real waste, if organizations not success after spending quite a lot of amount of money and time.

Over the last decades, there has been a dramatic growth in the attainment of ERP systems. However, more recently, there has been an increase in reported ERP failures worldwide despite the initial promise (Bingiet al., 1999; Tasi et al., 2010). In Sri Lankan context the situation is the same. The organizations that had implemented ERP systems are not all satisfied with their projects (Fernando, 2004). Therefore implementation of ERP system in Sri Lanka is new concept.

Challenges and barriers in implementing ERP System

The main challenges to ERP implementations are simply the high start-up costs and the long time periods their projects consume other types of potential problems such as technical, change management and project management, were also seen as challenges but with lower level of severity comparing to resources problems. The results showed that these businesses have realized the need for such systems and plan to take it up in the near future. These businesses which have not had yet ERP systems, reported the large capital investments these systems require, as well as intensive

training, and having other important priorities as the main barriers for adopting ERP systems.(
Emad M. Kamhawi, (2008) "Enterprise resource- planning systems adoption in Bahrain: motives).

Complex technical organizational, cultural and political issues that have made the integration process a very challenging task” (Huang et al., 2003) in today’s dynamic and unpredictable business environment, companies face the tremendous challenge of expanding markets and rising customer expectations (Razmi et al., 2009). ERP implementations are challenging due to cross-module integration, data standardization, adoption of the underlying business model, compressed implementation schedule and the involvement of a large number of stakeholders (Soh the critical challenge in ERP implementation has been to first identify the gaps between the ERP generic functionality and the specific organizational requirements (Soh et al.,2000). According to Davenport (1998), even though some of the causes of ERP failures lie with technical challenges, these are not the main reason enterprise systems fail. He stresses that the biggest challenges are business problems in the sense that companies fail to reconcile the technological imperatives of the enterprise system with the business needs of the enterprise. One of the biggest sins in the implementation of an ERP system is not to understand the true significance of what you have taken on and, therefore, not commit the right resources to the project (Kogetsidis et al., 2008).et al., 2000).

The integrity of the data used to operate and make decisions about a business affects the relative efficiency of operations and quality of decisions made; protecting data integrity is a challenging task (Vosburg and Kumar, 2001). One of the issues in information management is getting the right information to the right person at the right time and in a usable form (Youngberg et al., 2009). Information research has demonstrated that inaccurate and incomplete data may severely affect the competitive success of an organization (Hongjiang et al., 2002). Poor quality information can have significant social and business impacts. (Strongetal.,1997)

3. Methodology

3.1 Population and Sample

The listed entities over 20 sectors in Colombo Stock Exchange (CSE) were selected as the target population for this study. The following table illustrates the breakdown of the population

Table 2: Sectors and number of companies

Sector	Listed
Banking, Finance and Insurance	71
Beverage, Food and Tobacco	23
Chemicals and Pharmaceuticals	12
Construction and Engineering	4
Diversified Holdings	19
Footwear and Textile	3
Healthcare	7
Hotels and Travels	38
Information Technology	2
Investment Trusts	10
Land and Property	19
Manufacturing	41
Motors	6
Oil Palms	5
Plantations	19
Power and Energy	9
Services	8
Stores Supplies	4
Telecommunications	2
Trading	9

(CSE, 8th September 2017)

Among these 311 listed companies, random sampling was used to select the sampling units for our research.

3.2 Data Collection

Semi structured questionnaire & interviews were used to collect the primary source of data over the selected sector wise public listed companies. In order to identify the variables affecting to ERP implementation, published research papers have been used and the questionnaire was based on the variables affecting to three stages of ERP implementation such as; pre-implementation stage, at the implementation stage, post implementation stage & testing stage.

The objective of this research study is analyzing the challenges and barriers in implementing ERP in public listed companies of Colombo Stock Market. According to the responses received for the questionnaire, main variables affecting to ERP implementation were identified and those were analyzed using Statistical Package for Social Sciences (SPSS).

3.3 Hypothesis

H1: Companies with trained employees could reduce challenges faced in implementing ERP

The training program construct is a measure of how easy it is for users to be trained on the system, to understand the content material, and to navigate through topics applied to daily tasks. O'Leary (2000) and Bradford and Florin (2003), state that the degree of preparedness of ERP users to meet situations and carry out a planned sequence of actions without upstream errors has an instantly positive impact on business.

Teaching how to use the system will improve familiarity and boost its use. Therefore, we inference that companies with a higher degree of training tend to enjoy greater readiness to use ERP.

H2: Companies with good financial resource could implement ERP by overcoming challenges in implementation

The healthy finance resources of the company measure in terms of business funds as cash, deposits with financial institutions and cash equivalents, corporate capital, total assets and etc. Financial management involves planning, organizing, controlling and monitoring financial

resources in order to achieve organizational objectives. Balancing the new, more constraining capital, leverage and liquidity requirements crucial to optimizing performance.

The stronger financial resources the easier it is for to raise finance, and probably at a lower cost. so strength of the financial resources will help to purchase an ERP package in most viable way to the organization. we therefore inference that companies with a good financial resource could overcome the challenges in implementation rather than the companies having insufficient financial resources.

H3: Companies with adoptable business strategy are able to implement ERP by overcoming challenges in implementation

The complexity construct is measured on, how quickly users can become proficient with the application, and how comfortable they are using it. Studies concluded that ERP complexity is a major factor for successful implementations. When users are comfortable using ERP, it scales up the users' knowledge of the system and increases their skills in manipulating the system in effective ways and it prepares users to understand the system trends sufficiently and comprehensively, if not users will get frustration and unwillingness to use the system.

H4: Companies with high top management commitment ERP implementation could reduce challenges faced in implementation stage of it.

The company's high top management commitment is measured by how they help to communicate with suppliers, partners, and customers. Management must also define the processes and how best to conduct them to meet customer requirements, while delivering the required quality at the lowest possible cost. Power of the top management helps to face the industry competition and helps to gain the competitive advantage.

Direct participation by the highest level executives in a specific and crucially important aspect or program of an organization. Top management commitment could aid to reduce the challenges faced in implementing ERP by serving on a quality committee, Formulating and establishing quality policies and objectives, providing resources and training, overseeing implementation at all levels of the organization, evaluation and revising the policy on light of results achieved.

H5: Companies with high complex process faces more challenges in implementing ERP system

The complexity construct is measured on, how quickly users can become proficient with the application, and how comfortable they are using it. Studies concluded that ERP complexity is a major factor for successful implementations. When users are comfortable using ERP, it scales up the users' knowledge of the system and increases their skills in manipulating the system in effective ways and it prepares users to understand the system trends sufficiently and comprehensively, if not users will get frustration and unwillingness to use the system.

H6: Companies with high collaboration could implement ERP by overcoming challenges in implementation of ERP

The collaboration construct is measured by how easy it is to collaborate with collaborate with colleagues, partner with ERP System, and communicate with suppliers, partners, and customers. ERP systems help users to collaborate, increasing their productivity and the health of their firms and business partners.

ERP systems are platforms that allow both humans and applicants to collaborate, from meeting basic accounting to promote enterprise performance. ERP systems provide users with a structured communication channel with the right information at the right time, resulting in increased productivity.

H7: Companies with high compatible information Technology system could reduce challenges in implementing ERP.

The compatibility construct is measured by the degree to which the ERP system matches IT features, such as compatibility with hardware and other software. Rajagopal (2002) concluded that one of the primary reasons for the inability of many firms to realize the full potential offered by IT is the incompatibility among the various computer hardware and software systems. Information is exchanged only at the local units which are unlikely to have significant impact on the productivity of firms because of such incompatibility. Hence, ERPs that are compatible with other computer hardware and software systems communicate with one another and at the same help organizations shift from a traditional functional mode to a business processing mode and optimizing the resulting business processes to take full advantage of the technology and help companies enhance their performance.

H8: Companies with high vendor support could implement ERP system by overcoming challenges faced in implementation

Companies with high vendor support could measure in terms of quality of the vendor services, qualifications of the vendors, reactions of prior users, cost of the service, retention rates and etc. acquiring of the system, it is important how much support vendors will provide to implement and maintain the system.

High vendor user support and technical support will help organization to make installation and implementation easy. We therefore inference that high vendor support could make easier to companies to overcome the challenges faced in implementation.

4. Analysis and Discussion

4.1.1 Primary Data Analysis

An online survey questionnaire was used for the data collection at various stages of implementation of ERP system. The questionnaire was developed by the team based on the previous literatures with the assistances of supervisor. The initial questionnaire was tested by collecting data from the 10 organization to ensure that the validity of the survey. Questionnaire were sent to the corporations by the end of September for 100 listed entities and obtained response from 77 (77%) and 58 valid responses were returned covering the manufacturing, banking and finance, hotel, service organizations, Diversified business and other firms. Respondents within the organization per person such as Chief Operating Officer, Finance Manager, Accountant, IT Manager and other finance or Accounts executive (Table 1).

Table 01

The characteristics of the sample (N=77)

Characteristics	Percentage
<i>Industry Category</i>	
Manufacturing	47.7
Banking & Finance	9.3
Hotels	9.3
Services	12
Diversified	12
Others	41.6

<i>Respondent Type</i>	
COO	1.3
Finance Manager	44.2
Accountant	10.4
IT/IS Manager	32
<i>ERP Package</i>	
SAP	46.8
Oracle	15.6
Dynamic NAV	7.8
Sage	6.5
IN Bank	3.9
Other	11.4
<i>Current usage of ERP</i>	
Yes	89.6
No	7.8
<i>Category of the module</i>	
Fully Integrated	71.4
Separate Module	19.5
<i>Number of years using ERP</i>	
Years < 2	12.1
< 4	17.9
> 8	69.0

The results in Table 1 show number of years ERP system being used by the companies, category of the module and position of the respondent.

Through the analysis found that most (89.6%) of listed entities in Sri Lanka uses ERP for their operations. A high percentage (69%) of the listed entities use ERP system for more than the 8 years SAP is the most popular (46%) ERP system is used by the listed entities. In addition, it was found that most (71.4%) uses fully integrated ERP system in contrast to the separate module of ERP system.

The constructs theorized under Section 3.3 were operationalized and measures were developed based on the literature analysis. The constructs were measured using five- point Likert scale. The control variable is industry type.

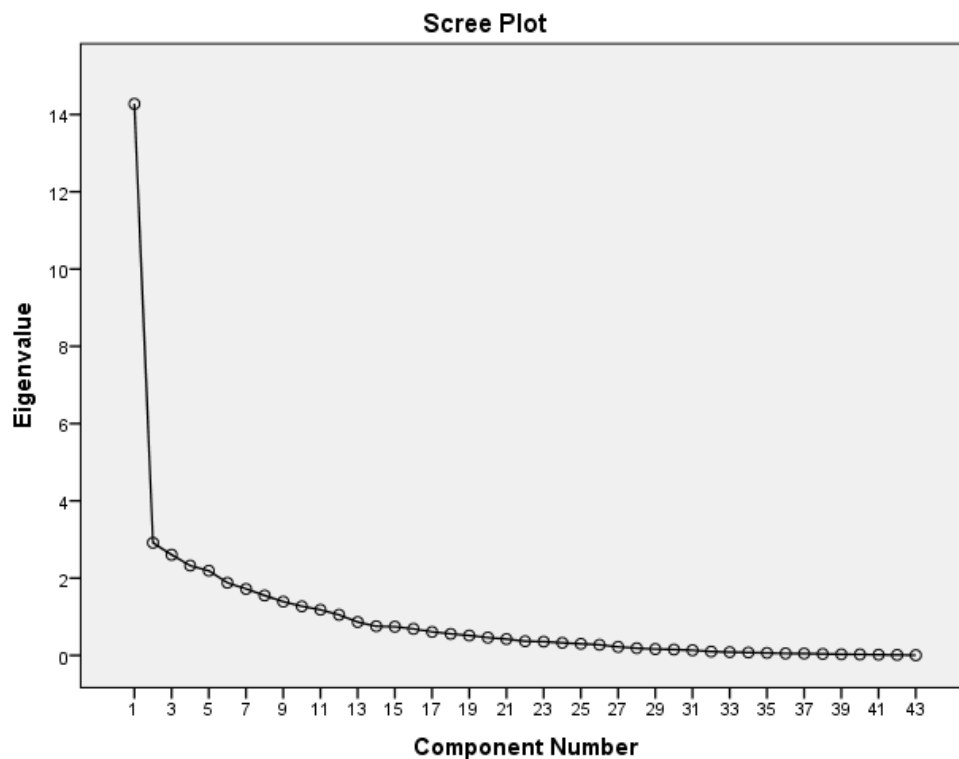
Table 02

Variables	Mean	Std. Deviation	Skewness	Kurtosis
Top Management Commitment	3.916	0.793	-0.838	0.971
TM1	4.174	0.7467	-0.951	1.371055
TM2	4.029	0.6854	-0.883	1.959916
TM3	3.928	0.7731	-0.857	1.007084
TM4	3.710	0.8928	-0.791	0.530569
TM5	3.739	0.8686	-0.708	-0.01113
Vendors	3.457	0.958	-0.495	0.150
VE1	3.667	1.0098	-0.693	0.063006
VE2	3.623	0.8243	-0.489	-0.21445
VE3	3.691	0.9020	-0.471	-0.44155
VE4	3.812	0.9591	-1.256	1.806941
VE5	2.493	1.0931	0.437	-0.46607
Financing	3.709	0.704	-0.870	1.239
FIN1	3.812	0.6480	-0.802	1.416955
FIN2	3.853	0.6293	-0.622	1.295859
FIN3	3.591	0.7437	-0.785	0.150721
FIN4	3.580	0.7935	-1.270	2.09205
Business Plan & Strategy	3.287	0.879	-0.173	-0.378
BSP1	3.681	0.6750	-0.695	0.605077
BSP2	3.821	0.5754	0.010	-0.14145
BSP3	2.913	1.0811	0.249	-1.16616
BSP4	3.338	0.9714	-0.332	-0.39863
BSP5	2.681	1.0913	-0.097	-0.7894
Compatibility	4.026	0.653	-0.848	2.456
CB1	4.029	0.6177	-0.788	2.523591
CB2	3.957	0.7161	-1.421	4.475151
CB3	4.000	0.6642	-0.930	2.309724
CB4	4.145	0.6009	-0.481	1.652386
CB5	4.000	0.6642	-0.620	1.319403
Complexity	3.779	0.840	-0.719	0.463
CX1	3.783	0.8553	-1.013	1.25665
CX2	3.391	0.9582	-0.248	-1.06771
CX3	3.824	0.8968	-0.407	-0.50456
CX4	3.824	0.7111	-1.013	1.512919
CX5	4.074	0.7788	-0.911	1.117861
Training	3.904	0.671	-0.537	0.917
TN1	3.882	0.7437	-0.479	0.322719
TN2	3.942	0.6616	-0.565	1.128633
TN3	3.853	0.5799	-0.461	1.135192
TN4	3.971	0.6636	-0.591	1.214717
TN5	3.870	0.7053	-0.588	0.785404

Competitive Pressure	3.522	0.823	-0.663	1.193
CP1	3.565	0.7948	-0.311	0.682864
CP2	3.377	0.9252	-0.487	-0.07979
CP3	3.623	0.7495	-1.191	2.977022
Collaboration	3.888	0.754	-0.700	1.092
CO1	3.841	0.7401	-0.407	0.199533
CO2	3.853	0.7179	-0.522	0.554949
CO3	3.971	0.8039	-1.171	2.522085
ERP Challenge	2.180	0.804	0.764	0.729
OUT01	2.232	0.7697	0.368999	-0.00298
OUT02	2.101	0.7697	0.819089	0.912133
OUT03	2.206	0.8735	1.103779	1.277277

Cronbach's Alpha was used to assess the internal consistency of the measures. Cronbach's Alpha is considered as a measure of scale reliability. As per the measures alpha coefficient for 43 items is 0.883 suggesting that items have high internal consistency.

In addition to computing alpha consistent of reliability, factor analysis was carried out to investigate the dimensionality of the scale. Through the analysis it was found that eigen value for the first factor (14.25) is larger than the eigen value for the rest of the factors (2.916). Further, first factor accounts for 33.18% of total variance. The analysis suggests that scale items are unidimensional.



Through R2 value examination it was found that the ascendants (top management commitment, vendors, financing, business strategy & plan, compatibility, complexity, training, competitive pressure, collaboration) could explain ERP challenges in 92.8%, implying a good fit model. Overall the results provide support for the determinants described in Section 3.3.

4.1.2 Discussion

The developed research hypothesis in Section recognizes eight causes of challenges & barriers in implementation of ERP system in Sri Lankan quoted companies.

Amongst those determinants, external environmental factors (collaboration, competitive pressure and vendors) cause a significant impact on the implementation of ERP system. The firms with high level of dependency over the suppliers and customers have more challenges in implementing the ERP system. The challenge emerges due to the dependency on the parties outside the organizational boundary. Those parties were outside the scope of an organization & their operations, processes; policies can't be significantly influenced by the entities to match their requirements. ERP is a system includes Supply Chain Management (SCM) system and Customer Relationship Management (CRM) system. When implementing ERP in an organization the attention has to be paid to the supplier's systems & for customer systems in order to reduce the mismatches among them. Competitive pressure is an important driver in the implantation of an ERP system. Most of the firms have implemented ERP system due to institutional isomorphic forces. Through the analysis of the results it was found that firms have adopted ERP in order to attain the competitive advantage over the competitors. The drastic changes in the industry, turbulent business activities by the competitors emerges challenges in implementing ERP system successfully.

Proper selection of vendor is an important determinant in implementation of ERP system in a firm. Proper selection of vendor is crucial as it impacts the quality of the ERP system implemented. The technical competence, quality of service provided, experience of vendor is considered to be crucial in above of the cost of the package. The proper of selection of vendor helps organization to drive away the challenges in implementation of a ERP system. A good vendor is able to predict the challenges & barriers found in implanting a ERP system & able to design the strategies to overcome those. With the support of ERP experts, the organization could

implement the system successfully overcoming the challenges in implementing. Improper selection of vendor raises the significant risk in implementing the system ultimately raising the risk of failure of system.

In addition to the above the results have shown a significant influence (Table 02) as top management support in terms of finance, business strategy and employee training (internal environmental factors) in implementing ERP system. In making the final decision to implement ERP system is in the hands of management. Our results are evidence to the relationship between top management supports in the successful implementation of ERP system. The reason might be regardless the cost incurred in the implementation, the importance of having reliable and real time data to make analysis is also need for a listed company to grow in the industry. In regards to organizational context factors in accordance with the study, the employee training program and best practices shows a relationship 11.6 % in implementing ERP system. Users were become suitable and familiar with ERP so that the company could be able to reduce the investment in terms of training and proficiency in using the system in an effective way.

Moreover our study reveals that the ERP systems are compatible with the network, hardware and software. The features of the system confirm probably ERP system need to be in line with the changes in the utility software and the operating system. Empirically it has revealed the compatibility is very likely than the complexity in implementing ERP system.

4.2.1 Secondary Data Analysis

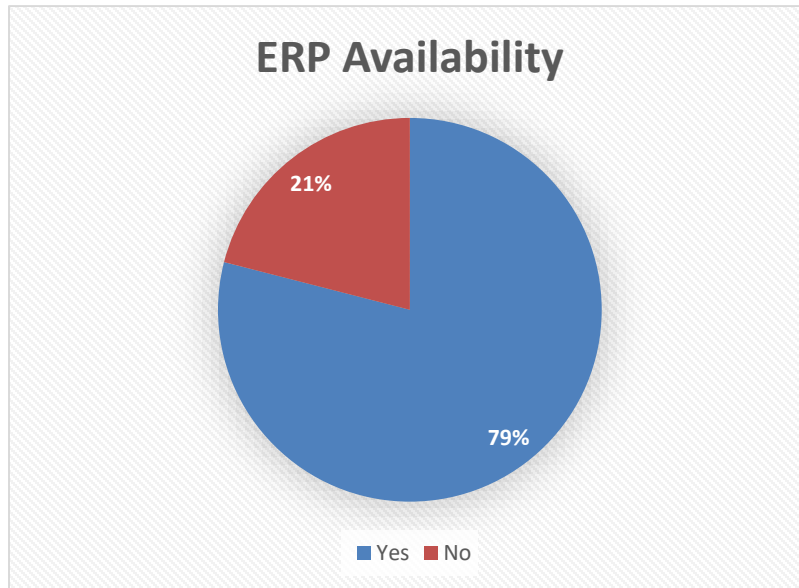
Secondary data has been collected through the analysis of annual reports and company web sites of 100 public listed companies. The sample has been selected on a random basis which covers all 20 sectors.

The following table shows the degree of using ERP systems in the selected public listed companies.

The characteristics of the sample (N=100)

Table 03

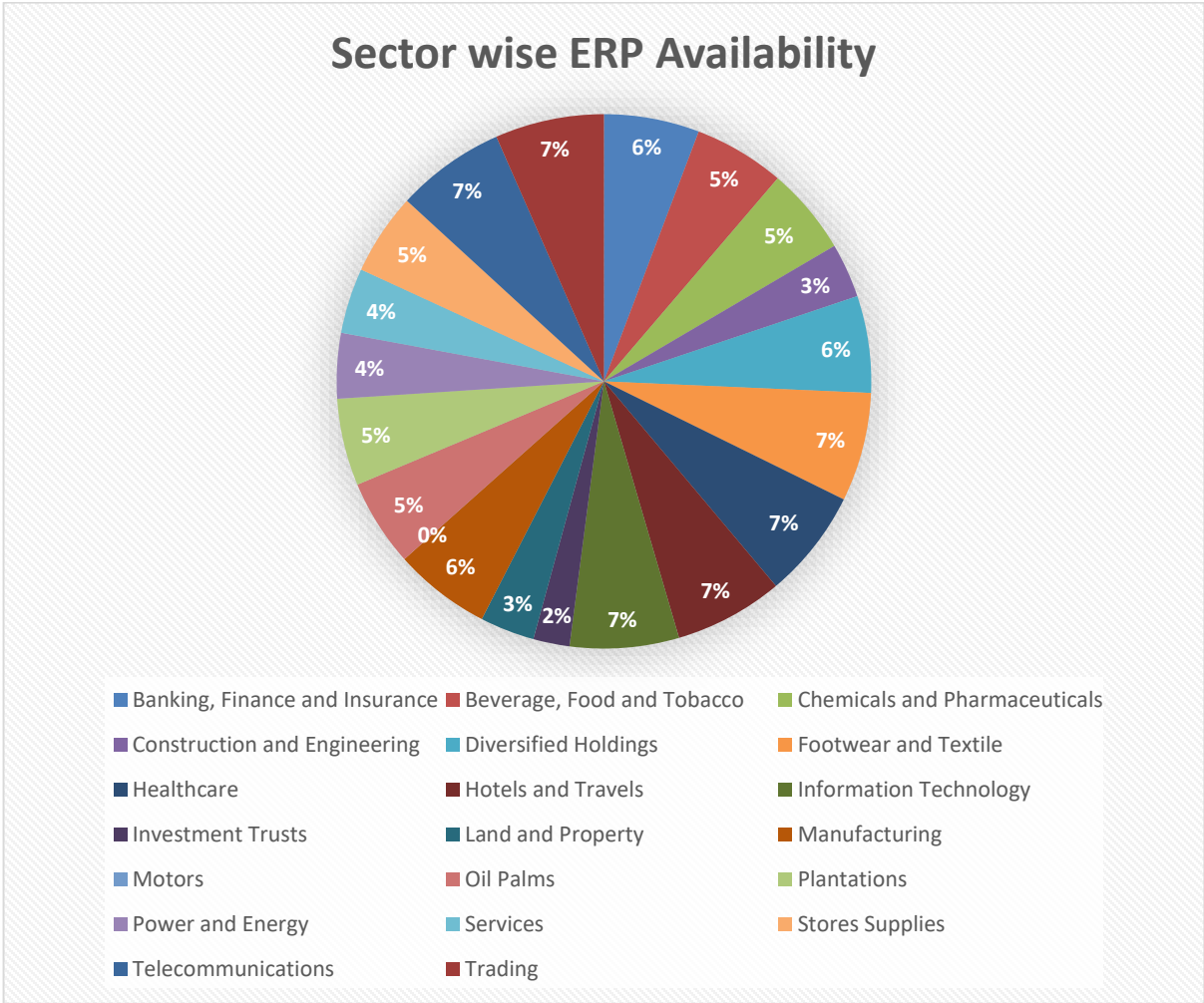
Industry	Sample	ERP Availability		Percentage of ERP Availability
		Yes	No	
Banking, Finance and Insurance	8	7	1	87.5%
Beverage, Food and Tobacco	6	5	1	83.3%
Chemicals and Pharmaceuticals	5	4	1	80.0%
Construction and Engineering	4	2	2	50.0%
Diversified Holdings	9	8	1	88.9%
Footwear and Textile	3	3	0	100.0%
Healthcare	5	5	0	100.0%
Hotels and Travels	10	10	0	100.0%
Information Technology	2	2	0	100.0%
Investment Trusts	6	2	4	33.3%
Land and Property	4	2	2	50.0%
Manufacturing	9	8	1	88.9%
Motors	1	0	1	0.0%
Oil Palms	5	4	1	80.0%
Plantations	5	4	1	80.0%
Power and Energy	5	3	2	60.0%
Services	5	3	2	60.0%
Stores Supplies	4	3	1	75.0%
Telecommunications	2	2	0	100.0%
Trading	2	2	0	100.0%
	100	79	21	



Observation

From the selected 100 companies, 79 companies have currently implemented ERP systems while other 21 companies not implemented yet.

Analysis of sector wise availability of ERP systems



Observations

The graph shows sector wise classification of the 79 companies, which are currently using ERP systems. Banking and Finance sector, Telecommunication, Hotel and Travels, Health care, Footwear and Textiles etc. are the prominent sectors which are using ERP systems.

4.2.2 Discussion

Based on the findings from Annual Reports and Company websites, followings are identified as main ERP systems adopted by selected companies.

SAP

Oracle

Sage

Finacle

Findings from Research Articles

Through the analysis of previous studies on ERP implementation in Sri Lanka, following challenges, barriers and key success factors have been identified.

Author	Research Article	Year	Identified challenges and Barriers
Vathsala Wickramasinghe (Department of Management of Technology, Faculty of Engineering, University of Moratuwa, Moratuwa, Sri Lanka)	Critical elements that discriminate between successful and unsuccessful ERP implementations in Sri Lanka	2010	Following variables are identified as Critical Success elements affecting ERP implementation : -Project completeness within the allocated time and budget -Accuracy and Stability of implemented ERP system -Contribution to achievement of Business goals and objectives
W. K. R. Costa H. S. C. Perera	Analytic Hierarchy Process for Selection of ERP Software for Manufacturing Companies	2008	Identified following Challenging Factors : -Technology availability -Vendors Position and After sales agreements -Cost -Risk -Functional Fit -Compliance with the business strategy -Change management and implement ability
Vathsala Wickramasinghe (Department of Management of Technology, Faculty of Engineering, University of Moratuwa, Moratuwa, Sri Lanka)	Impact of ERP systems on work and work-life	2012	Addresses issues such as: -Impact of ERP system on work and work-life in organizations -Post-implementation impact of ERP on problem solving support.

Manoja Karunasekara (Department of Management of Technology, Faculty of Engineering, University of Moratuwa, Moratuwa, Sri Lanka)			
T.S. Madurapperuma Y.K.D. Galkotuwa G.L.C.A. Gunawardana R.A.D.K.M. Ramanayaka D.R.H. Walpola and S. Thelijjagoda	ERP Deployment in Manufacturing Industry in Sri Lankan Context	2009	<u>Usage Issues in ERP</u> English and IT Literacy Issues Garbage in – Garbage out User Short Cuts High training cost
H.S.C. Perera T. Withanage	Critical Success Factors in Post ERP Implementation	2008	"...inability to meet expectations can be considered as failures and sometimes companies have incurred negative returns on investments as a result of such failures." " ERP implementation projects take times ranging from one to five years depending on their size and the scope..."
Prasad Perera Samudaya Nanayakkara Asoka Perera	Critical Evaluation on ERP Applications for Defense Sector of Sri Lanka		"The ERP implementation project may run in to huge cost and schedule overruns if not properly managed."

Academic implications

This research is to demonstrate the theoretical value of the ERP system in the process of data analyzing in an organization. This encourages to learn ERP system as entity as a whole, since the ERP usage in many industries had significantly influenced in determining the business value. As evidence our research results also discovered the value relevance of implementation of ERP in the organization. Through this study we captured the key strategies and motivates in ERP system implementation process.

Moreover, as it can be stated, Accountants need a wide range of knowledge due to the rapid changing technological environmental changes. The management accountants concern on ERP is comparatively higher than the operational level employees, because relevant models which supports in the decision making process has been linked with all the financial and managerial models.

5. Conclusion

A systematic investigation for the purpose of analyzing challenges and barriers of implementing ERP in public listed companies of Colombo stock market was carried out. 100 public listed companies representing all 20 industries were selected as the sample. Data were collected through semi structured questionnaires and interviews carried out with responsible personnel of the selected companies.

This study reveals that top management commitment, Vendor selection, financing, business strategy plan, compatibility, complexity, training, competitive pressure, collaboration are the key determinants affecting the ERP implementation in its various stages and those are having a direct relationship towards the success of ERP implementation.(92.8% relationship)

The study was based on primary data gathered only from public listed companies in Colombo stock market and results may not be relevant for non-listed companies and foreign companies. Not all companies which have implemented ERP have been considered for the study and the focus was only on the selected 100 companies which represent all 20 sectors. Focus was to identify the challenges and barriers in implementing ERP systems in public listed companies of Colombo stock market, but this research does not provide any recommendation or solution to overcome those identified challenges and barriers.

However, within the limitations this research study has achieved its objectives and directs prospective researchers to conduct more studies relating to the subject that will provide further insights to this research area.

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