CRITICAL EVALUATION ON ACHIEVING TOTAL IMPLEMENTATION OF ERP IN MANUFACTURING FIRMS

Hudson Wewalage

(128276G)

MBA in Project Management

Department of Civil Engineering

University of Moratuwa
Sri Lanka

May 2017

DECLARATION

I declare that this is my own work and this thesis/dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

Also, I hereby grant to University of Moratuwa the non-exclusive right to reproduce and distribute my thesis/dissertation, in whole or in part in print, electronic or other medium. I retain the right to use this content in whole or part in future works (such as articles or books).

Signature: Date:

The above candidate has carried out research for the Masters/MPhil/PhD thesis/

Dissertation under my supervision.

Signature of the supervisor: Date

CONTENTS

ABSTRACT

Enterprise Resource Planning (ERP) system has been one of the most popular business management systems, providing benefits of real-time capabilities and seamless communication for business in large organizations. However, not all ERP implementations have been successful. Since ERP implementation affects entire organizations such as process, people, and culture, there are a number of challenges that companies may encounter in implementing ERP systems.

This research is the quest to find out the feasibility of implementing an ERP system for the manufacturing sector in Sri Lanka, focusing on the cost benefit of production planning, purchasing, inventory management, and supply management optimization. Literature was reviewed in order to study ERP systems, usage of information technology in manufacturing sector, manufacturing information system and global case studies of ERP system implementations on manufacturing sector and return of investment of from above optimization.

Application software systems must be architected in order to deal with the current and future needs of the business organization. Managing optimization of production planning, purchasing, inventory management, and supply management using architecture-centered methodologies must be an intentional step in the process of deploying information systems which not an accidental by product of the software acquisition and integration process.

ACKNOWLEDGEMENT

Though the work in this dissertation is my own, many people have been involved in its creation both directly and indirectly, and these are the people I would like to express my thanks to.

First of all, I want to express my gratitude to my supervisor professor Asoka Perera for believing in this project as much as I have, and for supporting the process with guidance and insights I could not have been without.

I would like to extend our thanks to the Master of Business Management program coordinator professor Asoka Perera. My deep sense of appreciation goes to the academic staff of the department of Civil Engineering, University of Moratuwa, for the invaluable advices and guidance.

Lastly we thank all the individuals who assisted us in making this endeavor a success.

LIST OF FIGURES

LIST OF TABLES

CHAPTER 1:   INTRODUCTION

1.1.ERP background

Information systems become the most valuable aspect due to highly competitive worldwide business atmosphere. And organizations hope to develop or continue their aggressiveness by using information systems to expand customer service, reduce cycle times, and expenses. Enterprise resource planning (ERP) systems deliver many advantages to organizations so they can face altering opportunities by giving accurate, timely, and incorporated information to develop choice generating (Trott and Hoecht, 2004).

ERP is a software based commercial management system that incorporates with all aspects of the trade, including planning, manufacturing, sales, and marketing. ERP systems can be used to cope with operational business information for corporate resource planning. ERP shall be used in finance, supply chain management, manufacturing, HRs and logistics and data analysis. Following business functions can be provided with ERP (Yen et al., 2001).

- ➢ Manufacturing and logistics.
    - ▪ Input orders
    - ▪ Transportation management
    - ▪ Project management
    - ▪ Plant maintenance
    - ▪ Customer service management
    - ▪ Warehouse management

- ➢ Finance
    - ▪ Accounts receivable,
    - ▪ Fixed assets
    - ▪ Cost control
    - ▪ General ledger
    - ▪ Accounts payable
    - ▪ Treasury management

- ➢ HR
  - ▪ HR administration
  - ▪ Payroll
  - ▪ Self-service.

Following shows the major key components in ERP systems:
- ➢ Enterprise database
- ➢ Client server system
- ➢ Application modules

ERP system is maintained by client/server technology and its usage is generally set up in distributed method. Certain ERP systems deliver web based interface. ERP system is continuously executed using a primary database system (Yen et al., 2001).

All usages in the ERP system interrelate with the database, which confirms the reliability of the enterprise data. ERP dealers deliver various components for corporation's units, which are finance/accounting, sales, Human Resource, manufacturing and logistics etc. Most application modules can be combined for ERP processes.

Mostly ERP systems create huge enterprises depend on information technology. Systematize routine process in sections such as accounting, inventory control and procurement that completes organizational accessing through automatic updating of the operation data. ERP unites several functions of the organization in a combined approach. It increases the reaction to customer requirements and distributes products to market rapidly using compressed cycle times. ERP system creates data available in real time and after this allows for a more comprehensive and unified data supervision. ERP applications are worthy at taking and storing data, but their recording abilities are a key concern to ERP users (Scheurich, 2002).

Nowadays, manufacturing is looked with a regularly changing, unreliable environment that compliments the intensifying and competitive environment in which

companies function in general. Competition is increasing and needs are becoming more serious. The burden on manufacturing companies is to decrease costs and increase the quality of products and services. Production management (Neely, 1991) is vital to handle the demanding environment of the business and in or der to be successful; it must achieve the manufacturing of the saleable products as follows,

➢ Integrating manufacturing with further tasks such as supply chain, etc.
➢ Considerate effectively on how planning, scheduling, shop floor control and stocks affect manufacturing.
➢ Having in place a successful and proficient manufacturing set up.

1.2. Challenges facing ERP systems

Most of the times ERP system uses to combine corporate wide data from several sources so that distributors, suppliers, external sources and corporate employees can generate good use of the data. Currently, the necessity of data dispersal through the organization limit is broadly growing and systematic functions are no longer the province of certain internal consumers in the organization. Therefore companies must distribute the analytic ability to several operating levels, aimed at particular occupational requirements through real time analytics, Key Performance Indicators and dynamic reporting (Agostino, 2004).

Though, ERP systems do not appear to deliver all of the needed purposes. Following represent the functionalities to be handled by ERP systems,
➢ Budgeting ability. Corporate funds can be recognized and maintained in numerous methods. Financial variations, nevertheless, want to be controlled in external methods, which expected that the budget data in the ERP system will soon turn into outdated.
➢ ERP systems do not backing budget provision and profit and loss reporting. For those types of complex analysis need external software or systems (Agostino, 2004).
➢ Reporting proficiency. Frequently, ERP systems do not suggest reports about analysis on product line revenue. Similarly, ERP systems are not skilled to

provide ad hoc reporting facility. Online views of industry processes are also not offered (Agostino, 2004).

➢ Most ERP applications do not provide corporate decision making tasks (Agostino, 2004).

➢ Practical difficulties. For example ERP are complex processes, executing such processes can be problematic, expensive and time consuming. Due to ERP are difficult in nature, individual training convert into a problem to every ERP accepted companies.

➢ Systems integration ability. One more fault of ERP systems is its inadequate integration ability with further systems, e.g. CRM and sales strengthen automation systems' predicting ability could be used to permit business decision if they can be coped with ERP systems. Similarly, the budgeting tools are often not well coped with ERP systems, which cause concerns on financial data constancy.

1.3. ERP problems

There are many issues associated with ERP clarifications. At beginning, the term "Enterprise" in ERP denotes only to the back office, barely the entire enterprise (Lee, 2002). Nevertheless, ERP is still immense sufficient to strength lots of businesses to do tasks in various ways and that can demonstrate problematic for huge organizations as occasionally, Therefore it need a fundamental variation in their business procedures. As stated by Mc Vittie (2001), anyone who has tried to adjust business techniques even marginally recognizes that this is hurting. It is accordance with available literature on this area such as Sumner (1998) and Davenport (1999) who aids those ERP customizations is a problematic assignment. Hence, in finding for an ERP clarification, companies must first define if their old business applications would be capable to acceptable within a typical ERP platform (Samad, Marinos & Rashid, 2004).

1.4. Failure in ERP implementation

ERP is projected to provide an important development over the non-comparable nature of previous organizational information systems. Therefore literatures of ERP systems delivering advantages such as facilitation of process, improved managerial

decision making, cost decreases and upgraded productivity (Shang and Seddon, 2000; Barki and Pinsonneault, 2002; Kamhawi, 2008; Federici, 2009).

Still there are also frequent reports of ERP failure:

➢ A latest survey exposed that 65% of senior manager be certain of ERP application has at least a reasonable chance of troubled their business (Aladwani, 2001, p. 266).

➢ Numerous ERP systems still face resistance and disappointment between 50% and 75% of US organizations take part in some degree of failure

➢ 70% of ERP executions unsuccessful to provide expected profits (Wang et al., 2007, p.200).

➢ Failure degrees projected to be as high as 50% of all ERP applications (Muscatello and Parente, 2006, p. 61).

➢ Three fourths of the ERP projects are found failures and many ERP projects completed catastrophically.

1.5.Objectives

To evaluate the failure factors of achieving total ERP implementation.

ERP systems have become the key component of organizations all over the globe giving an edge over competitors. Even public organizations all around the globe have decided to move in to ERP systems for better service outputs.

Objective is broken down into following two components.

1. To evaluate the failure factors of achieving total ERP implementation in manufacturing firms.
2. Find the degree of success in implementation of ERP systems in manufacturing firms.

CHAPTER 2:   LITERATURE REVIEW

2.1.   Introduction

Enterprise Resource Planning (ERP) is an operating system that incorporates business tasks and data into an individual system to be shared inside an industry. Even if Enterprise Resource Planning commenced from manufacturing and production planning systems utilized in the manufacturing trade, Enterprise Resource Planning increased its capacity in the 1990's to other back office tasks such as human resources, production planning and finance. Also, in recent years ERP has united other business developments for example Customer Relationship Management (CRM) and Supply Chain Management (SCM) to convert more competitive extensions as shown in figure 2.1 (Abbas, 2011).

Supply Chain Management (SCM)	Customer Relationship Management (CRM)	Enterprise Performance Management (EPM)	Human Capital Management (HCM)
Sales Force Automation (SFA)	Electronic Commerce (EC)	Business Information Warehousing (BIW)	Educational Students Systems &Virtual Learning Environment
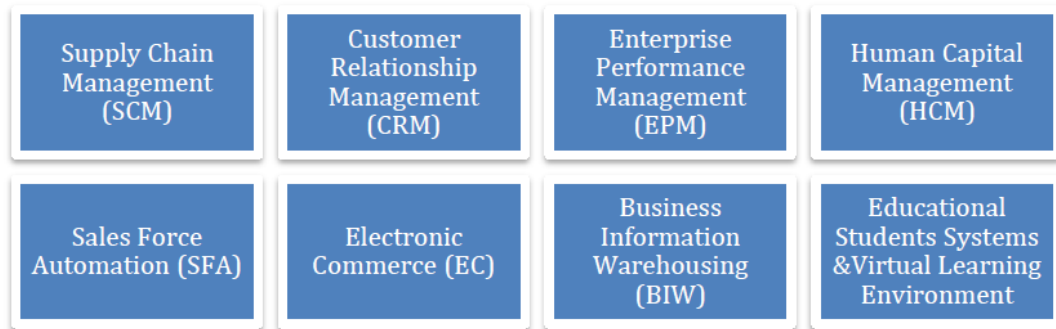
Figure 2.1: ERP extensions

The most important objective of ERP is to raise operating competence by improving business developments and decreasing expenditures. ERP permits various departments with various requirements to connect through each other by sharing the similar facts in a specific system. It consequently raises collaboration and affairs among all industry components in a group on these origins.

Similarly, ERP regulates data and processes in a company with best methods. The company also streamlines data flow among various measures of a business by generating a one transaction system. The integrated and standardized ERP software nature delivers a degree of interoperability that was hard and costly to complete with separated and branded systems. Integration and Standardization of data and processes

allows a business to incorporate executive activities, increases capability to form fresh information system functionality and decreases information system maintenance charges.

Due to its advantages, ERP has converted into the strength of professional intelligence for companies by providing executives an incorporated vision of business processes. Enterprise Resource Planning is planned to comply with original business stipulates simply. The continuous technological improvement and the increasing difficulty of ERP need businesses to frequently upgrade their systems. Mostly ERP vendors deliver a chance to update methods and line up with recognised best methods to meet different business requirements more rapidly.

In this chapter, the existing literature is going to be analyzed. The aim of this chapter is to point the literature analysis with regard to current familiarity about the ERP systems, use of Information Technology (IT) in manufacturing firms and to express specific research questions to be asked and problems to be reviewed. The main areas of literature study includes evaluation on achieving total implementation of ERP in manufacturing firms and its uses in modern industries, Sri Lankan manufacturing sector, global case studies on manufacturing information systems, and especially global case studies on ERP systems in manufacturing sector. The literature review will provide the basis of knowledge to move forward with the study (Dover, 2012).

Generally, IT is the use of computers and software to direct information. Another technical definition may be IT is concerned with technology to maintain information. The acquisition, storage, processing, and distribution of oral, numerical, graphical and textual information by microelectronics generate from both computing and telecommunications.

Generally, at present information has become an essential tactical and financial asset of organizations and companies. Its accelerated development as regards work out systems, telecommunication networks and software packages, has considerably developed the management of data, and mostly its diffusion and nature. Therefore, IT, the science of transmission, collecting, storing and processing of information progressively has to develop a science of communication (Chaudhry et al., 2006).

The manufacturing organizations are regularly more viewing Information and Communication Technologies (ICTs) as a vital enabler for quickening and accomplishing corporate social and economic improvement in their nations. ICT is realized as a significant tool for developing deliverance of creating government, public services more transparent and liable, improving public involvement, enabling the sharing of information and knowledge between the publics and incorporating marginalized groups and ejected sections.

ERP systems integrate both internal and external management information through a whole organization, accounting, sales, implementation finance, customer relationship management, facility and manufacturing etc. Enterprise Resource Planning systems computerize this action with a combined software application. Their objective is to create probable the flow of information among all business tasks inside the restrictions of the firms and manage the relations to outside participants.

The business process uselessness regularly without delay organizations to commence considering the employment of ERP solutions due to it assures the reasonable benefits of business process computerization improved equipped efficiencies and simple accessibility of data. ERP system execution, if one pick suitable ERP software and monitors the finest practice of execution process, certainly will enhanced the system by which a company implements gradually processes (Helo et al., 2008).

2.2. Information systems

ERP system can be shown as a system that incorporates all information that processes inside a business and can be considered as a huge information system. Information systems field to be extensive, by number of various meanings reliant on the information systems exploration view one adopts.

This research approves an evaluation on total employment of ERP of information system that aids the fundamental concepts of what constitutes an ERP scheme. The information system is well-defined as an assembly of subsystems defined by organizational or functional boundaries, which support decision making and maintain in an organization by using IT to capture, operate, store, retrieve, transmit and

demonstrate information utilized in one or more business applications (Hanafizadeh et al., 2011).

2.3. Information system development and implementation

The ERP system can be witnessed as a big scale IS and thus treasured information can be derived on information systems applications. Employment of IS in organizations has excessive ability for specialists as it can recognize problems to progress under upcoming system implementation attempts, though serving to form the theoretical experience for studies in information systems.

Different parts of IS occur, each concentrating as following on vary features of IS development and execution. Following shows the great variety of IS improvement and implementation (Chan et al., 2010).

- Implementation methodologies
- Organizational change
- Organizational structure
- Business processes redecorate and reengineering
- User satisfaction
- IS and information quality
- Project management methods
- Software development methods
- IT and IS in organizations
- IS success
- Power and politics throughout IS development
- Knowledge management
- Requirements gathering

IS application have been from a technical method of the improvement of IS in the 60's and 70's. After this was concentrated on large scale IS execution projects in the 1980's. It was monitored by a business process method to information systems from the 1990's up to nowadays. Most of the IS and IT projects have been big scale outsourcing tasks where firms have outsourced the improvement of IT systems, rather than increasing in house systems. This is not applicable to this research project to go

into fact of each one of these extents of interest or review the state of management information systems.

2.4. Information system development success

The factors that helps to success Information System will also differ based on the vary stakeholders and the vary perspectives can have when concerning IS and thus it has been very difficult to outline the success factors. These IS success factors adapt particular and individual IS execution projects, due to every project can have rare features.

IS has the ability to design both structured and unstructured issue solving which can be of extensive use in the re-engineering of processes in the ERP system. Information can come through the boundaries of several functional departments and also across organizational limitations. This enhances the time taken for such transactions and also the efficiency as human intervention is nothing in such relocation of information. The process modeling can be successfully carried out in an electronic media using the power of IT and can effortlessly come out with the best process flow without creating any physical variations in the process flow prior to ERP implementing (Forslund, 2010).

2.5. The ERP phenomenon

ERP software doesn't perform to its contraction. The planning doesn't affect it too much and also resource. But recall the endeavor part. It is the ERP's exact ambition. ERP software tries to fit in all departments and functions throughout a company onto an individual computer system that can assist all those department's exacting needs.

Constructing an individual software program that assists the requirements of people in funding as well as it does the people in human resources and in the store is a great order. Every of those divisions normally have its own IS improved for the exacting methods that the division does its task. But ERP unites them all together into individual or united software program that goes off a indiviual database so that the several divisions can further simply share information and interconnect with each one

The incorporated methodology can have a remarkable profit if firms connect the software acceptably. For an example if we take a customer organization, a client orders an arrange, that order creates a mostly paper based journey from inbox to inbox all over the organization, every so often being entered and re-entered into unlike section's computer systems along the way. Those relaxing around in inbox lead interruptions and miss orders and all the setting into different computer systems requests faults. At the moment, nobody in the organization really recognizes what the standing of the order is at any specified position due to there is no approach for the finance section, e.g. to access the warehouse's computer system to realize whether the item has been distributed and also it is familiar refrain heard by unsatisfied clients (Maditinos et al., 2012).

ERP run over the ancient outside computer systems in finance, human resource, the warehouse and manufacturing modifications them with an individual united software program separated into software components that approximately the old separate schemes. Finance, the warehouse and manufacturing all quiet get their specific software, expect now the software is connected together so that somebody in finance can observe the warehouse software to realize if an order has been transported. In the 90's Enterprise Resource Planning was made as a strongly combined monolith, nevertheless most vendors' software has since developed into stretchy enough that you can mount some components without purchasing the entire set. In such of organizations will mount only an ERP finance or human resource component and leave the rest of the functions for additional day.

Proceeding to the ERP model, every division in an enterprise has their individual remote software application which did not relate with any other scheme. Such inaccessible frameworks could not coordinate the inter-division processes and hence hindered the efficiency, performance and speed of the typical organization. Therefore following matters will be occurred.

> Shortage of synchronization
> Incompatible trade standards
> Uncreative decisions
> Incomplete understanding of the endeavor functioning

Manufacturing management systems have progressed in phases over the past 30 years from a simple means of calculating material's needs to the automation of a whole enterprise. In the period of 1980s, over-frequent changes in sales predictions, demanding continual re-alterations in manufacture, other than that unsuitability of the parameters fixed by the scheme (Rom et al., 2006).

Manufacturing Planning and Control (MPC) systems have commenced from the time when the beginning days of the industrial revolution. To achieve a historical viewpoint, it is beneficial to look at the progress of these schemes. Following shows the key phases involved:

- Materials Requirement Planning (MRP) systems
- ERP systems with MES
- MRP-II with Manufacturing Execution Systems (MES)
- Manufacturing Resource Planning (MRP-II) systems
- Reorder Point (ROP) systems

As studied in detail, every phase signifies the following logical stage in manufacturing attitude and high-tech innovation over the previous stage.

At the beginning, control systems and manufacturing planning comprised of groups of plant foremen, each liable for the preparing of production, arrangement of materials, and load of products within their allocated plant area. Even if their ability varied widely, the relatively easy design and operation of these plants permitted even the most poorly skilled foreman to function them effectively. At the beginning industrial era firms derived, greatly specialized ROP systems of manufacture and inventory control progressively switched the simple and frequently unproductive plant foreman method.

ROP systems have been termed as being positional in environment. They utilize a historic tactic to predicting upcoming inventory demand, which admits that previous data are symbolic of upcoming demand. If an item's inventory level drops under some scheduled level, both extra inventory is ordered or new production orders are issued in Fixed Order Quantities (FOQ). Even if the most early ROP systems were manual,

computerized ROP systems quickly monitored when commercial mainframe computers were presented in the late 1950's and early 1960's. Throughout the mid-1960s computerized materials need planning methods gradually initiated to interchange ROP systems as the manufacturing control system of high-quality. MRP systems offered a clear benefit in that they provided a forward looking, requirement based order (Stoel et al., 2009).

In the 1970's the main competitive thrust moved to industry, which caused in the adoption of recognised market methods with a significance on better production addition and planning. In the 1980's the main competitive thrust transformed to excellence. Manufacturing tactic highlighted better process control, superlative manufacturing, and decreased functioning costs by the late 1980's the rising manufacturing insecurity handled by USA. Firms could be connected to the wavering nature of IT and the increase of time based competition. Technology both generates and transforms choice, which in turn transforms the marketplace using innovative changes to customer and supplier abilities. Quick advances in information technology rendered the previous rules of competition and well established attentions of customer supplier relationships obsolete. Consumers never cared how providers carried out business last year or even yesterday for that matter. They only care about provider's capability to generate or familiarize new products and services on a timely basis to comply with client's particular requirements today. This new certainty converted into the essential for a dynamic production environment in which processes and products may differ weekly and manufacture plans may differ on a consistent or even hourly basis (Palaniswamy et al., 2000).

MRP-II systems need a high grade of human interference in creating the appropriate alterations to schedules and in defining the optimal arrangement of manufacturing orders that finest accommodates the dynamic and frequently volatile environment of the shop floor. Though the capability requirement plans and system file inspecting abilities of MRPII do deliver valuable extra feedback in writing the status of shop floor actions, they deliver less information about how to achieve the implementation of these actions. Through the mid 1990's many companies and professional organizations like application programming interface attained the decision that a more progressive MPC system, proficient of real-time manufacturing planning and

implementation control was required. Table 2.1 is represents the manufacturing planning and control system stage features (Patrick et al., 2000).

MPC Stages ➤	ROP	MRP	MRP-II	MRP-II / MES	ERP / MES
MPC characteristics:					
1. Overall production planning orientation	Positional (based on historical demand)	Predictive (based on future demand)			
2. Material planning	Min/max reorder point logic	Lot-for-lot & min/max reorder point logic			
3. Capacity planning	Manual capacity planning		Capacity requirements planning (CRP)		
4. Manufacturing execution & control	Manual production execution & control		Shop floor control (SFC)	Real-time machine feedback & control	
5. Master planning	Manual master scheduling		Limited decision support (DSS) features		Full DSS features
6. Cross-functional data linkages	Degree of cross-functional information access and sharing varies by firm				Real-time information access and sharing
IT characteristics:					
1. Information technology focus	*Automating* power of technology (i.e., IT enables manufacturing firms to realize greater cost efficiencies.)			*Informating* power of technology (i.e., IT enables more effective decision making.)	
2. Computer hardware environment	Mainframe Systems ───➤ Mini-Computer Systems ───────────────────────────────➤ Client-server systems ───────────➤ Web server systems ➤				
3. Information processing	Batch-processing	Online transaction processing		Real-time transaction processing	
4. User interface	Command-based		Menu-based	Graphical user interface (GUI)	
5. Database technology	Sequential files	Hierarchical database ────────────────────────➤ Relational database ──────➤ Object-oriented Database ➤			
6. External MPC interfaces to customers and suppliers	Manual forms & correspondence ──────────────────────────────── - - - - - - - ➤ Magnetic tape ──────────────────➤ Electronic data interchange (EDI) ──────────➤ Internet & Extranets ─── ➤				

Table 2.1: Manufacturing planning and control system stage features

At the beginning on the aspiration of ERP systems has been to:

➢ Create applicable information for decision creating purposes in real time

➢ Distribute shared data and practices through entire enterprises

➢ Take part all operation systems within the similar system

The era of ERP systems initiated as early as the 1950's, when the first computers were presented in firms. The computers gradually converted into corporate accounting systems and after the first real ERP systems adapt to the independent organizations that were announced during the 1980's. That type of initial ERP systems were very expensive to keep and improve and were often too costly particularly for small and middle level firms to apply. The advantages from the above stated three ERP systems dogmas have not yet been completed with in small and middle level organizations that proceed with legacy systems and lesser detached IT systems.

Ten years later in the early 1990's the second generation ERP systems generated. Large organizations were now capable to present great united ERP systems, from

vendors like system application products A/G and Oracle. This kind of ERP systems were pre-formed to care the business processes of the end client organization in a method that was supposed as best method from the opinion of the ERP system vendor. Though these ERP systems were expected to be typical sets, they regularly needed comprehensive customization attempts to meet the necessities of the firms. The execution project itself was far more costly than the costs of the software licenses. The total costs for the employment of an ERP system are currently considered a sever obstacle for small and middle level organizations. Through this in mind the mission for the following generation ERP systems has initiated (Kasper, 2009).

2.6. ERP implementations

It is the organization's capability to familiarize, form, and incorporate information flows and business methods. Even though an organization may commence ERP, they requires familiarizing, forming, and incorporating its information flow and business processes on a constant basis due to markets modification and new technology are commenced. Effective ERP execution comprises redesigning business processes from a strict, mass-transaction orientation to an alert, lean, and knowledge-based.

Throughout business process conversion methods, firms must integrate corresponding training packages, functioning activities, and information technologies to backing the developing substructure. The consequence of properly executing ERP is to progress firm achievements mainly affected by reformed business processes, incorporated managerial purposes, speeded reporting cycles and extended information abilities (Ramirez et al., 2010).

There are mixed reports regarding the outcome of ERP projects. Doing well ERP applications are definitely exposed, such as Pioneer New Media Technologies and Monsanto, but fewer successful projects have directed to bankruptcy proceedings and litigation against IT suppliers. Almost 90 percent of ERP applications are late or in excess of funding, which may be due to lower cost and plan estimates or modifications in project possibility rather than project management failure. ERP system software packages are greatly combined, complex systems for businesses, and so many of businesses are maintaining them positively worldwide. Where companies

such as Hershey, Jo Ann stores, Whirlpool and Samsonite that have worried through typical tragedies, identify the software suites ability to handle the task. The systems are an ability functioning as promoted; nevertheless, firms run into and sometimes serious problems with the employment and successive maintenance of these packages. Referring to The Gartner Group, 70 percent of all ERP projects fail to be completely executed, even after three years. Normally, there is no single culprit accountable for an unsuccessful implementation and no separate reason to be accredited for an effective implementation (Gattiker et al., 2004). Even the explanations of failure and success are gray areas, giving to explanation. The most common two levels of failures are,

- Complete failures - The development either was rushed before execution or unsuccessful so sadly that the company witnessed significant long term financial loss.

- Partial failures - They often caused in weak adjustment processes for the corporation; generating some systems of disruption in regular processes. In the same mood, an ERP victory can be a comprehensive success one in which the whole thing goes off without a delay, or one in which there are few arrangement difficulties, resulting in negligible inconvenience or downtime. Regularly, these situational conditions that have to be ironed out in the weeks and months after the go-live date are not simple sufficient to interrupt the regular actions.

ERP software mechanizes fundamental trade activities, such as manufacturing, human resource, finance, and supply chain management, by incorporating best methods to enable quick decision-making, cost decreases, and greater executive control. These influences make ERP software combination complex, since consensus is required from a whole enterprise to reengineer a key business development and get advantage of the software (Kemp et al., 2008).

ERP execution can gain massive benefits for effective companies or it can be unsuccessful for organizations that unable to succeed the execution process.

2.7. ERP implementation strategies

Nowadays organizations meet a fresh challenge of increasing competition, increasing markets and enhancement in customer potentials and thus ERP systems have been advanced to offer a total business system in order to progress business performance. The software is a group of applications that connects processes such as manufacturing, human resources, financial, document management, data warehousing, after sales facility, sales force together and aids companies control jobs such as order processing and production arrangement. ERP points out that the care of employing ERP solutions should move from the tough elements to the easy issues linked to such an implementation of ERP. It is spoken human related and organizational culture issues, when attempting to simplify the purposes for ERP implementation failures. Furthermore, a successful ERP execution needs suitable executive interferences as part of the execution process.

Great performance in the manufacturing firms, performance in overall can be found by three factors such as motivation, working environment and ability. More performance can be described by the interconnecting of above three factors.

There are nine recognized areas which grant to influencing an organization's capability to attain greater achievement, which is based on the impression that certain natures of behavior will direct to certain types of consequences, and that it is people who are the key factors, furthermore it is essential that the working atmosphere is correct and that people are managed in a mode that brings out their best, thus increasing performance on morale and commitment, while boosting them to manage the organization's developments in a method that will raise the level of performance and achievement. Following are the areas affecting high performance factors (Botta et al., 2005).

- Leadership
- Partnership and resources
- Strategy and Policy
- People results
- Society results

- Systems
- Customer consequences
- Key performance results
- People

According to the high performance are such things as objectives, determination, support and empowerment, through forms being things such as interpersonal skills, contribution, decision taking, and creativity managing the external atmosphere. The sustainability of high performance work systems is implied on organizations identifying the requirements of employees and executing sustainable policies and practices to strengthen its worth and principles through greater employee participation and also, by granting the significance of employee satisfaction and commitment over the improvement of incorporated employee consultation, organizational modification, work and life policies, place of work institutions and all-inclusive career expansion programs. ERP systems have been established to deliver a entire business system in order to progress business performance even as that establishments capability problems at all stages of the ERP system life cycle (Light et al., 2006).

There are many soft factors concerning ERP operations. These factors, frequently mentioned to as critical success factors (CSF) are as described are areas of tasks that should accept constant and careful attention from management, have been categorized into three main groupings of strategy, organizational and people are shown in Table 2.2 (Mamewick et al., 2005).

Type	Factors
Strategy	Top management guarantee
	ERP tactic
	Clear focus, scope and goals
	Legacy systems management
People	Employees attitude
	Training and education
	Project team
	Empowerment
	User satisfaction and involvement
Organizational	Managerial culture

	Computer culture
	Effective communication
	Change management strategy
	Successful project management
	IT development
	Process management

Table 2.2: Soft factors of ERP implementations

2.7.1. Strategy factors

Higher management delivered all human and financial resources for effective execution of ERP, without their contribution and support; the firm would not implement the ERP system. They delivered the essential resources, leadership for ERP application, clear guidelines of the project, training and their character developed into the post execution phase. There was a approach for ERP execution and perfect objectives. The business processes were obviously reengineered before ERP project commenced, the operation approach was step by step, Most of the employees were well skilled, and the configuration process was generated to permit the organization to save money and time. Legacy system at the firm was simple; due to the company's mutual business processes and a modest practical architecture. Hence, the degree of technical and organizational vary was lower.

2.7.2. People factors

The end individuals were occupied in the ERP project by assembly in the system expansion and application processes in the initial phases, elaborated in telling the

company information system needs and requirements and the company gathered end individual thoughts regarding the ERP project. There was executive support available to give individuals who did not have the correct skills advantageous reaction about the ERP project. There was struggle to vary from employees in the initial phase of the ERP execution because of the fewer awareness of the ERP system through employees' less considerate of the strategic assurances of ERP project. Defiance improved when top management gave more clarification about ERP and when employees initiated to have preparation about the ERP system. The process team was diverse with internal staff and consultants. Preparation and learning about the ERP system began at the start of the project for some chosen employees. This kind of training was about how the system would work and vary the changed business methods. Employees recognized, from the initial phases of the ERP project, dissimilar kinds of preparation in the company as well and preparation tools were delivered in hard copies for every person preparation.

2.7.3. Organizational factors

The project management division was well-known and a project manager was chosen from the skilled workers. Individuals in project management were given authority and the execution strategy was clearly well-defined. ERP system was consisted in redesigning the present business procedures. The corporate processes were examined to recognize the possible probabilities of redesigning. To start following the fresh system the major business processes were redesigned and advanced to support a different kind of organizational structures. The principle for presenting the new system was generated by authorizing employees, involving more employees and training and education. Furthermore, the key technique for notifying employees about the ERP project was supported through individual communication by the manager. Information Technology maturity and computer philosophy were felt to be at the desired level. The applicable credentials and knowledge of the employees were also acceptable, so that both the IT maturity and computer philosophy were supportive for the required levels for ERP execution achievement (Kumar et al., 2003).

2.8. Failures and success of the implementations

Organizational learning could be concerned mutually a common and exact theory of interest to the research of ERP executions. This segment discovers how losses and achievement of the execution of the ERP in manufacturing organizations. ERP

support that managing manufacturing forces as well as organizing the division of labour more than simple implementation. Such change attempts may comprise answers but it also needs organizational variations, incentives, trade involvement over extended times and capability to implement potentially stressful judgments such as making staff redundant. ERP argue lesser fundamental matters, such as the structure and the capability to change, are significant to concentrate in order to failures of implement ERP.

2.8.1. Failures of the implementations

Identifying failures of ERP can be a challenge for managers, mainly because there are various techniques in which they can be defined and classified as below.

- **Expectation failure -** When the IT schemes do not tie with user forecasts.
- **Process failure -** When the project is not finished within the stipulated period and budget.
- **Correspondence failure -** When there are no match between IT schemes and the prearranged purposes.
- **Interaction failure -** When user's approaches in the direction of IT are negative.

A number of causes are recognized to above failures of implementations were occurred from the literature such as following.

- **Low skills in a project team**

  It is essential to create a skill composed project team having internal and external specialists, managerial abilities, good awareness of the processes and IT skills. This project team's technical and business capability will add to the ERP's execution success or failure. The knowledge and skills of the project team are significant as long as proficiency in extents where team members have lesser knowledge. For instance a project team typically separates after setting up, its character is important in the initial phases and less significant post setting up. Certain applicable fundamentals are; accurate skill and competencies mix, key player involvement, capability to finish assigned work,

excellence of ERP professional, previous accomplishments, motivation, reputation and flexibility.

- **Less contribution in higher management**

  Contribution, top management assurance and support are expected to affect the accomplishment of ERP implementation. Continuous management support is vital during the project. Organization's experience emphasizes the significance of higher management contribution in performing and planning ERP system.

- **Difficult architecture and high number of execution components**

  The number of execution components raises project complexity and also main architectural concerns are significant throughout the beginning and implementation stages to avoid the need for extra software. If not sufficiently planned adaption and personalization of implements may lead to concerns.

- **Insufficient BPR**

  Some packaged software is unsuited with the firm's essentials and business methods. The effect is software adjustment, which are costs severely in maintenance or restoration of the firm's business methods to familiarize the software. As per the manufacturing organizations, its deep investigation of process business significance and performances is compulsory to line up tasks to be supported by ERP. Also to avoid business processes redesign is a failure in ERP operation, BPR activities and ERP projects. ERP modules deliver many business methods that might be comprised as portion of a BPR, nevertheless there is still probable to be a essential for nonstop process development.

- **Poor management conducting**

  Successful project execution needs a well-articulated corporate vision that creates the objectives and the business model after the project. Perfect goals and purposes, should specify the overall instructions of the project and stay

strong through all its phases. Successful management also increases customer prospects and aids in arranging the preparation of individuals in the use of the completed scheme. In this cause of failure comprise the use of a organized method of project improvement and execution.

- **Insufficient change management**

  The ERP system is not user friendly and its process is not completely technological. It adjusts the mode that the organization controls. To undervalue the determination involved in change management may cause in project unsuccessful, specifically in the initial stages of the project.

- **Poor leadership**

  There are some crucial character of social enablers for successful ERP acceptance such as durable and dedicated management, open and truthful statement, and a well-balanced and authorized execution team. In certain condition found that all three may participate to ERP achievement but that only the first could be recognized as required. If project managers and directing committee do not implement to resolving issues and in case supervision to the project team, the cause of unsuccessful is larger.

- **Insufficient IT system issues**

  Technical software abilities essential to be considered before operation difficulties and their effect on business processes evaluated also such as these are vital for ERP accomplishment. Technical features that are important for all relevant functionality, scalability, movability, consumer friendliness, flexibility, modularity, simple upgradeability, security, versioning management, existence of a whole direction, a process guide to help users, and data precision. Due to the united nature of ERP software, if particular fundamentals are missing or unsuccessful there can be bad effects during the enterprise.

- **Insufficient IT system maintainability**

  Maintainability is the capability of equipment to face effective objectives with a least expenditure of maintenance attempt under operational environmental situations in which planned and unplanned maintenance is implemented. ERP maintenance and upgrade activities are very significant in ERP using organizations. In some instances, maintenance expenses are about 25% of the early ERP costs per annum and upgrade costs have been evaluated to be as much as increased amount of the early ERP implementation.

- **Unsuccessful tactical thinking and planning**

  Manufacturing firms must decide why an ERP system should be executed and what serious business objectives the system will report. Therefore, recognizing business objectives, finding the strategic business problems and strategic necessity identification are vital fundamentals of the ERP planning process. Arrangement of IT tactic with their business approach must be supported by senior executive support. If a group tries to connect a system without generating a pure vision, each attempt can convert to a tragedy

2.8.2. Success of the implementations

Success ERP implementation factors can be termed as those limited serious areas where things must go accurate for the business to succeed and success for any information systems project. Inside an ERP context, success execution for ERP system will be desired to ensure a successful ERP project. There are some success ERP implementation factors as following (Kalling, 2003).

- Appropriate decision making framework
- Top management support
- Management structure
- Clear goals, focus and scope
- Expert consultants
- Research skills
- Technical and business knowledge
- Flexible project team
- Project management

- Business process reengineering

- Existence of a winner

- Insignificant customization

- Change management

- Education and training

- User participation

- Discipline and standardization

- Usage of vendors' development tools

- Top employee for full time planning

- Culture

- Monitoring and assessing of performance

- Management of potentials

- Vendor package selection

- Vendor/customer companionship

- Software progress testing and troubleshooting

- Effective communications

- Information and access security

- Hardware problems

- Implementation tactics

- Interdepartmental cooperation and communication

2.9. ERP and organizational change

Organizations occur of diverse structures liable on the diverse features of the organization and the situation that they are opposing. Investigation has specified that the representation of information technology into these organizational arrangements influence on the present executive formations. There have been durable signs that the advantages from an ERP operation is essentially derived from the modification in the organization and that the ERP system is just a successor for these variations.

This directs into the term Business Process Reengineering (BPR) and the truth organizational deviations that take place after and throughout a BPR activity. A significant focus, but to some level neglected in the BPR build up, is the fact that the modification should emphasis on modification of processes and not on change of

technology. Certain ERP researches have tried to examine how organizational change can be best accomplished during an ERP execution. Research led in the field specifies that the university structure is predominantly unaffected to IT correlated variation.

Though this conclusion in the literature would specify a strong research interest in this exact area, little has been discovered. With a focus on a university atmosphere, there has been barely any research on organizational modification for a university that implements an ERP system, other than research done by researchers at the research site. This research aimed on a comparison between the users of the system, organizational impacts on the effective implementation of an ERP system and the impacts an organizational culture has on ERP systems implementation. It is a fact nevertheless, that different user wants different things in an ERP implementations and a main concern is to get the desires exact for the execution of the system.

2.10. Critical success factors of the for ERP implementations

There are different strategic tactics to ERP software implementation. There are several technical choices are the implementation of a standard package with least deviation from the typical situations and the customization of a system to fit local needs. From a management viewpoint, the nature of the ERP implementation issue comprises organization, technical and strategic dimensions. Therefore, ERP implementation includes a mix of business process change, or BPC, and software arrangement to align the software with the business developments. They established a critical success factors research framework based on experiences and skills of the organizations in the research. The critical success factors model is shown in Figure 2.2, groups the serious success factors into strategic and tactical influences. Each has factors specific to ERP projects.

Major success factor models have been enforced to general project management issues, manufacturing system application, and reengineering. There have recognized the factors required to guarantee a successful ERP project and to clarify different project consequences. Their tactic is mainly suitable for the investigation of ERP projects because it comprises the impact of strategic factors, such as technical software formation and project management variables, composed with larger strategic effects, such as the total implementation strategy. ERP framework will direct

managers in the development of an implementation policy and will help them create decisions by recognizing the role and influence of individual influences on each other and on the project consequence. They demonstrate their method with two case models from a research sample of eight corporations. The case analysis concludes the critical influence of legacy systems upon the implementation process and the significance of choosing an suitable ERP strategy.

Early choice of strategic factors and then added legacy systems and ERP strategy. This mutual list is now modified for ERP implementation projects, since it balances the focus of an organization with exact ERP requirements. Such requirements are defined business vision as the clarity of the business model behind the execution of the project. There is a strong model of how the organization should implement. There are aims or assistances that can be recognized and followed. They also outline project schedules and plans as the proper definition of the project in terms of critical paths, boundaries and landmarks.

List of strategic factors such as personnel, client monitoring and response, client consultation, acceptance and communication are added BPC and software arrangement, which are exclusive to ERP application. These further factors identify the serious role of aligning business processes to ERP software throughout implementation. While the typical project management factors are still significant, they play a secondary role to BPC and software configuration. Organizations require to understand their existing business structure and business processes related with their present IT systems, and relate this to the business processes limited within the ERP system. Some process modeling tools support organizations to align business processes with the typical package. For example, the ERP vendor has a tool, Move visual Enterprise that models business processes and automatically constructs the software. This tool has a depository of business processes that you can mention when you reengineer their present processes and plan new ones. For each core and support process in the ERP tool generic business process model there are some other processes linking to best practices in various types of operations and business environments that can be revised. For example, unwanted processes can be erased online and others can be added. Consequently, business processes can be modified without creating variations to the code. You can use this tool at any period after the

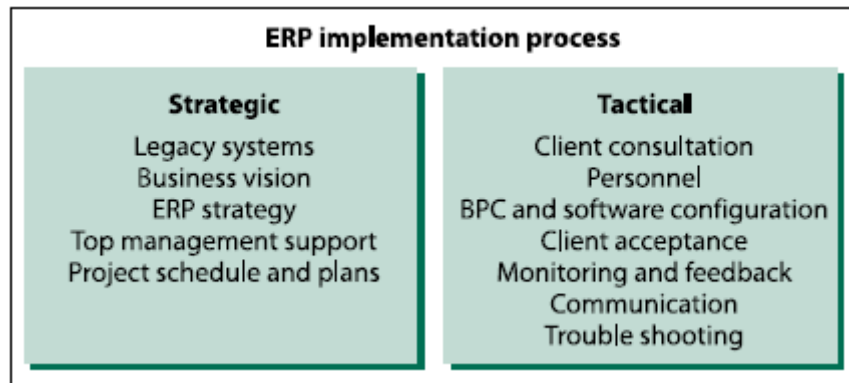early implementation process to allow continuous business process development (Kallunki et al., 2011).

Figure 2.2: Critical success factors model with strategic and tactical factors

2.11. ERP future trends

Away from the fact that ERP vendors are continually considering for original markets to move in, ERP vendors now deliver constant product enhancements to the organizations that already have gone live with their ERP platform. CRM and SCM are roles that ERP vendors are now trying to sell to organizations that have already bought and applied an ERP package.

The spotlight on probable markets for ERP vendors have been supposed to be on an organization' external partners when the ERP tries to answer the internal processes. These ERP future inter-organizational processes are defined ERP-II and are concerned with the next generation of ERP systems.

ERP systems have now touched a level of maturity where both software vendors and users recognize the technical, human resource and financial resources needed for execution and ongoing usage. ERP systems should now arrive an era of comparatively easy configuration that takes days and weeks with implementation finished in weeks, or at most 2-3 months. Main companies have appreciated the aids of short execution cycles and many are determined to implement a module in 6 months or less. This project management subjects related to large and medium scale applications will still be important matters, possibly controlled by global applications where conflicting business and personal cultures occur.

General ERP software packages are already progressively tailored to precise market sections, e.g. hospital, law office, automotive assembly, refinery, etc., such that niche markets create niche products and vendors. Preconfigured software modules integrating best practices and typical business processes will shorten future operations (Kemp et al., 2008).

Hardware and software architectural platforms within and among firms will progressively become commoditized with data modeling tools and translation software possessing the capability to transfer any quantity of data in any setup, and language, wherever in near real time. Gateways to both internal and external business information will become ordinary. Information based on user defined interest areas will be integral to the enterprise system architecture. Systems will become much brighter. Data mining and intelligence tools as well as expert systems and innovative planning systems with optimization will progressively be used to create and propose business decisions. Simulation will become a gradually vital element of an integrated extended enterprise planning and implementation system. Examples of main areas to take the advantages of simulation comprise available to capable match forecasting, supply network planning, order rate and response capacity planning, capacity planning, lead time, and cost accounting

Consolidation within the ERP industry is a continuing process that is also ripe for study and research. Consolidation changes within the industry also propose that those concerned in strategic planning may see equals with other industries that have suffered massive transformation such as autos and steel.

Company cultures have clearly been impacted by ERP consolidations. With mergers and acquisitions, many corporate cultures have been twisted upside down. This area is ripe for case studies and research addressing inquiries such as the human costs of consolidation. Consolidation also increases the question of project management in a international marketplace where Western culture may not dominate (Kamhawi, 2007).

As a final remark, it is our expectation that the industrial community in specific operations management, decision sciences, and management science in the industry

will take a much more vigorous role in the development of intelligent software logic that can be utilized by actual companies. As industrial they appear to be in an era where there is slight concern for engaging in research that can be directly applied to the planning and implementation functions within modern manufacturing. They do not mean this as a reproach of the rigor of existing academic research. Their point is that existing ERP technology delivers an information rich environment that is ripe for very intelligent planning and implementation logic, yet very little has changed since the late 1970's in the logic related with such applications as forecasting, rearrange point logic, MRP, production scheduling, etc. The present systems are now just performing the previous logic much quicker and in real time. The area is ripe for inventive new approaches to these old issues. This may comprise partnering with our business counterparts who living in this dynamic environment on every day.

CHAPTER 3: METHODOLOGY

3.1 Introduction

In this chapter explains research approach and motivation for choosing this specific topic. A brief discussion about study setting critical evaluation on achieving total implementation of ERP in manufacturing firms. Also this chapter determines the data gathering techniques from primary and secondary sources. Interview managers who are working under HR, procurement, and finance to find gap and understand the real causes of implementation of ERP in manufacturing firms. Also this chapter describes the methodology used in questionnaires and collection of data as appropriate and come up with the results in meeting the research objectives. The chapter starts with discussing the nature of the research to be doing and the process of adopting a suitable methodology. Further, this discusses the criteria for selecting the sample and data gathering tools and techniques.

1. Quantitative analysis of managers who are working under HR, procurement, and finance in selected manufacturing firms in Sri Lanka.
2. Identify relationship of several independent variables of such as implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP are depending on implementation of ERP in manufacturing firms.

3.2 Study setting

This study was based upon a quantitative approach, addressing each independent variable of implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP are affected to implementation of ERP in manufacturing firms in Sri Lanka. The design used a validated survey instrument of the Minnesota Satisfaction Questionnaire (MSQ) distributed to the selected managers where working in ERP in manufacturing firms in Sri Lanka.

The design is validated survey instrument by the MSQ in given random sample of size "n = 100" from a 150 of total population. The population of interest consisted of best

estimate of managers where working in ERP in manufacturing firms. Five independent variables, implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP were used to implementation of ERP in manufacturing firms, and then to predict knowledge worker motivation in the selected ERP in manufacturing firms as a function of the independent variables. Statistical analysis test was performed, using each of the six independent variables, to analysis whether the means of knowledge manager motivation vary significantly between each separation of the above independent variable's domains. These groups were further described in the analysis section. A Likert type scale was used, that being the same scale used by the MSQ. Total job satisfaction was scored by 24 MSQ questions of Likert type scale. Finally, an overall analysis, using all five independent variables and corresponding statistical analysis results, was performed. The statistical analysis tests for homogeneity of the means among the sub-domains constituting the independent variables used the percentiles from the MSQ normative scores. The closest population matches according to the given population. This was happened, there is debate as to whether a Likert-type scale constitutes an interval scale. Least square linear regression method was performed to determine the relationship of ERP in manufacturing percentile as an average of each independent variable. Apart from that, total results were used to construct charts and other analyses appropriate for ranked, but not interval, level data.

This study focused on factors affecting the ERP in manufacturing among managers of selected ERP in manufacturing firms. Research questions to be addressed relate to the project and satisfying following research objectives.

1. Identify the level of adherence of implementation of ERP in manufacturing firms.
2. Identify the factors that have an impact on the effectiveness of implementation of ERP in manufacturing firms.
3. Propose a framework and recommendation for the implementation of ERP in manufacturing firms.

3.3 Data collection method

This study based on data collected from managers of 100 in **selected manufacturing industries.** There used simple random sampling technique to select the sample from different ranks, such as implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP. Questionnaires were distributed among selected managers with explaining the purpose of this research and assured them that their response would be kept confidential. The questionnaire was proposed in English medium. Totally 150 managers are **engaged** in ERP in manufacturing firms, and distributed questionnaires among them and return back 100 questionnaires complete and usable were received. The response rate was 67%.

A self-administered questionnaire is to be used to collect data from key informants. The respondents were encountered face to face, the importance of the study was explained, the self-administered questionnaire is distribute and the respondents would request to fill the same and make it available for collection within several days. For those not willing or able to answer the questionnaire within that time, the completed questionnaire will collect at their convenience. The respondents are constantly reminding and encouraging responding, and those who return the complete questionnaire is rewarded with an indication of appreciation.

Questionnaires vastly used in quantitative researches, mainly due to the nature of conducting the research. But there is no hardbound separation on above, where the questionnaire can be used in qualitative researches too. Here, the questionnaire is used as a guide to the first data collecting tool, interview. The researcher uses the pre-prepared questionnaire in supporting his interviews conduct with different people at different levels throughout the research data collecting process. This is again a semi structured questionnaire and builds up as covering the scope of the complete according to research objectives. Different questions represent in covering the research scope of each objective and the questionnaire is designed including direct and open end questions. Using a questionnaire in a research make sure that all samples are covered with same areas of questions and the required knowledge of information is gathered as from different groups of interviewees. Also the

questionnaire is considered as a method of recording for the first technique mentioned above and a recording tool for the interview.

The findings of this literature survey help to understand factors affecting the implementation of ERP in manufacturing firms of managers working ERP in manufacturing firms, questions which are most suitable to fit with the literature survey expectations, by giving questioner to all managers and of each level of the organization.

3.4 Employee motivation scale

The employee motivation scale consists of 24 items, and respondents are asked to indicate a tick on a one of the each question weighted by a 5 degree of points by Likert-type scale, ranging in scores from "1" (Strong Disagree) to "5" (Strong Agree). The scales were extended to which they satisfied or dissatisfied with each the implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP. The description of implementation of ERP in manufacturing firms scale questions as follows.

1. Adequate and correct data should be provided it had to be collected from the distributed servers.
2. Training and testing of the system should be done properly by the ERP consultants.
3. Precision in management objectives and expectations from the ERP system are clearly stated to the vendors.
4. Observation the completion of ERP training provided to the staff and within some days of the system going live, many of the trainees from the organization quit.
5. Customization services involves any modifications or extensions that change how the ERP system works.
6. Stakeholders are all those who are directly or indirectly affected by a company implementing any new ERP system be it organizations like those of the supplier as well as the vendors..
7. It will be helpful before considering implementing to talk to an expert.

8. Choosing the right product is also expected to be a hard decision to make.

9. Getting an ERP system up and running can take approximately six months up to 2 years.

10. Data migration is another significant risk that you should evaluate in depth.

11. The right software suite is one thing, the right implementation partner is entirely another.

12. It is difficult to isolate decision processes, as decisions typically become interweaved with other decisions.

13. Many decisions do not imply distinct identifiable choices, and are difficult to pin down, in time or in place.

14. Decision making processes do not necessarily proceed as a linear sequence of steps, rather they are driven by the emotion, imagination and memories of the decision makers.

15. Personal administration report: report creates a list of employees who have information about their family members stored in the system.

16. Organizational management report: This report provides an overview of all existing organizational units.

17. Time management report: This report creates a list of the day balances, cumulated balances, or the time wage types determined by time evaluation.

18. Payroll report: This report generates the payroll journal using existing payroll results as a base.

19. Financial report: This report shows the payroll expenditures by cost center.

20. Inventory costs have been reduced within the company's supply chain.

21. Operational costs have been reduced within the company's supply chain.

22. On-time delivery has been improved within company's supply chain.

23. Accurate information is usually available for decision making.

24. Joint production planning and scheduling among suppliers, manufacturing, marketing, and distributors.

The MSQ was validated using managers of the ERP in manufacturing firms. Since managers are similar to labors in terms of job characteristics, the MSQ is an ideal instrument to measure job satisfaction in the managers, providing more specific information concerning the aspects of a job that an individual finds rewarding. The

MSQ is useful in exploring client vocational needs. Several studies used the MSQ to validate the relationship between ERP in manufacturing with implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP.

The MSQ is designed to measure the degree of factors affecting and ERP in manufacturing toward employee's job. In addition to that, it also measures an individual's perspective on job related perspectives. The MSQ is focusing upon occupational needs and values required for job satisfaction rather than personal attributes. The questioner was described 24 questions, which can be categorized above five motivation categories.

It is well accepted that the questionnaires vastly used in quantitative researches, mainly due to the nature of conducting the research. But there is no hardbound separation on above, where the questionnaire can be used in qualitative researches too. Here, the questionnaire is used as a guide to the only data collecting tool in this research. The researcher uses the pre-prepared questionnaire in supporting his interviews conduct with different people at different levels throughout the research data collecting process. This is again a semi structured questionnaire and builds up as covering the scope of the four research objectives. Different questions represent in covering the research scope of each objective and the questionnaire is designed including direct and open end questions. Using a questionnaire in a research make sure that all samples are covered with same areas of questions and the required knowledge of information is gathered as from different groups of interviewees. Also the questionnaire is considered as a method of recording for the only technique mentioned above. The findings of this literature survey help to understand use implementation of ERP in manufacturing firms, questions which are most suitable to fit with the literature survey expectations, as shown in above, by giving questioner which based on research onion frame is shown in figure 3.1 to the managers at the selected ERP manufacturing firms.

Figure 3.1: Research onion frame

These questions not rather indicate any requirement of qualifying or defining any dependent or independent variables. They focus more on the human sense making as the situation emerges. The study also attempts to assess other people's interpretations filtering their ideas based on the research objectives and feeding a series of events back to the reader. In addition, the study is not intended to report the facts, but to provide other people's interpretations. Finally, the study is intended to describe 'how it arrived at results' in order to establish better credibility.

Hence, gathering knowledge from their industry experts, who involve in ERP manufacturing firms, is crucial for the realization of the objectives. Similarly, gaining insight into people's attitudes, behaviors, value systems, concerns, motivating factors, aspirations, culture and lifestyles is important in order to build up the case and therefore this study can be classified as following the interpretative epistemology.

Interpretative research is not necessarily qualitative, but the qualitative nature of this study and the objectives and questions that need to be asked to realize them are open ended, evolving and non-directional. They are focused on Likert-type scale aspects

and hence clearly show signs of qualitative research. The study will try to explore and understand the different viewpoints through the eyes of senior level strategic and operational level resources. Hence, data gathering and analysis methods of the study will be more qualitative than quantitative. Therefore, qualitative driven interpretative philosophy is identified as most appropriate for the research.

3.5 Conceptual Framework

The conceptual framework is shown in figure 3.2 which is customarily designed by the researcher based on the literature review referred. Framework is structured and designed in order to cater the three research objectives and within the scope of the research methodology; qualitative, survey based case study. The researcher has analyzed the previous literature review and conceptualized the contributing factors in order to fulfill the three research objectives. All factors identified are listed under each objective, where efforts have being made to gather survey data in related to the defined factors for each objective area. Those factors are independent of each other and also the four objectives. Different tools used; interview and questionnaire during the case study survey are also mentioned in the framework as well.
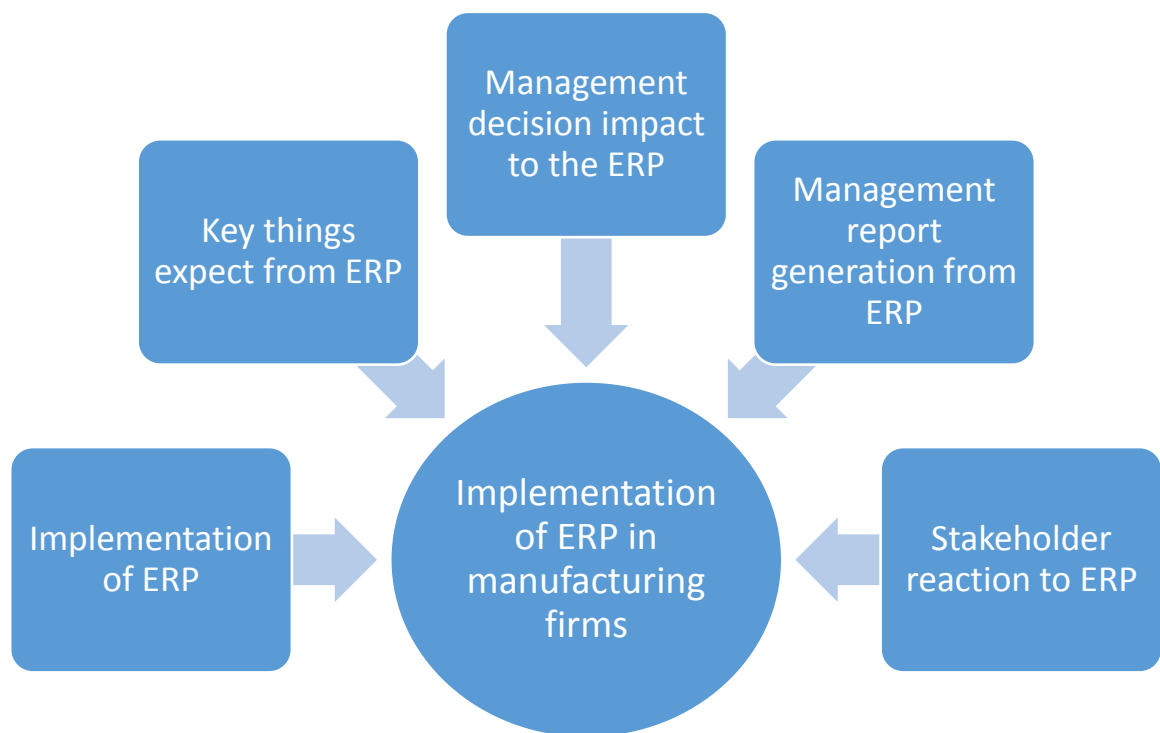

Figure 3.2: Conceptual framework for implementation of ERP in manufacturing firms in Sri Lanka

The research framework, as illustrated above covers the five independent parameters of the researcher. Though the whole research is a qualitative case study, the first objective is somewhat quantitative and hence both the questionnaire and interview will be used in gathering data. It is looked in to the different components in an organization, which indicate the measures of the level of usage of ERP in manufacturing firms.

The conceptual model of the implementation of ERP in manufacturing firms shows that such independent variables are affected to increase awareness among employees regarding their rights and expectation to evaluate their ERP implementation. The presence job satisfactions entirely depend upon the responsiveness of employees especially in variation culture of organization in term of economics composition. There is also significant relationship between motivation, team work, and experience in the manufacturing firms, and experience in the current organization. On the basis of these finding, expect that as follow.

Hypothesis I (H_1):
- Lack of implementation of ERP positively influences the implementation of ERP in manufacturing firms in Sri Lanka

Hypothesis II (H_2):
- In-accuracy of key things expect from ERP positively influences the completion of implementation of ERP in manufacturing firms in Sri Lanka

Hypothesis III (H_3):
- Lack of management decision impact to the ERP positively influences the completion of implementation of ERP in manufacturing firms in Sri Lanka

Hypothesis IV (H_4):
- Lack of management report generation from ERP positively influences the completion of implementation of ERP in manufacturing firms in Sri Lanka

Hypothesis V (H$_5$):

- Lack of stakeholder reaction to ERP positively influences the completion of implementation of ERP in manufacturing firms in Sri Lanka

CHAPTER 4:   RESULTS

4.1 Introduction

A questionnaire was developed based on collection of data, and was administered for a sample of 100 of managers where working ERP manufacturing firms in Sri Lanka. The questionnaire contained questions regarding overall effectiveness of managers to the ERP manufacturing practice perspective and questions that are related to specific aspects of satisfaction level, using a scale of 5 degrees, ranging from ''1'' (very dissatisfied) to ''5'' (very satisfied). The questioner is used for the investigation of satisfaction of each category, such as implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP.

In addition, the studies showed that the managers where working ERP manufacturing firms and practice with their jobs. The results under this section was revealed that several factors were associated with the implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP were used to analyze critical evaluation on achieving total implementation of ERP in manufacturing firms. While this study is able to identified and understand the external factors directly cause to effectiveness of implementation of ERP in manufacturing firms, also they are important factors that practitioners should be aware of. Key information discussions and focus group discussions were conducted to gain further insight into the findings. Descriptive and inferential statistical analysis data were taken from relevant departments.

This chapter aims to discuss the existing literature on the area of implementation of ERP in manufacturing firms in the context of the Sri Lanka and to determine the most important factors that affect the implementation of ERP in manufacturing firms, in order to build a conceptual framework. Even though there were various studies done on the area of implementation of ERP in manufacturing firms in a global context, the studies done on the local industry was limited.

Manufacturing firms also observed strengths of project planning, efficiency of target tracking, sufficient communication with stakeholders and sufficient risk management

during this particular time frame and manager reviews were not also effective as it should be. Following table 4.1 is shown results of the questions asked from of relevant managers where working in ERP in manufacturing firms in Sri Lanka which ensure the implementation of ERP in manufacturing firms.

	State ($n = 100$)	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Implementation of ERP						
1	Adequate and correct data should be provided it had to be collected from the distributed servers	15	15	19	22	29
2	Training and testing of the system should be done properly by the ERP consultants	32	22	18	14	14
3	Precision in management objectives and expectations from the ERP system are clearly stated to the vendors	16	17	19	24	24
4	Observation the completion of ERP training provided to the staff and within some days of the system going live, many of the trainees from the organization quit	29	24	19	14	14
5	Customization services involves any modifications or extensions that change how the ERP system works	24	26	18	17	15
6	Stakeholders are all those who are directly or indirectly affected by a company implementing any new ERP system be it organizations like those of the supplier as well as the vendors	14	14	14	26	32
	Total	**130**	**118**	**107**	**117**	**128**
	Percentage	**21.67%**	**19.67%**	**17.83%**	**19.5%**	**21.33%**

	Key things expect from ERP					
7	It will be helpful before considering implementing to talk to an expert.	26	24	18	17	15
8	Choosing the right product is also expected to be a hard decision to make.	24	26	15	16	15
9	Getting an ERP system up and running can take approximately six months up to 2 years.	24	29	15	16	16
10	Data migration is another significant risk that you should evaluate in depth.	21	24	22	17	16
11	The right software suite is one thing, the right implementation partner is entirely another.	17	18	19	24	22
	Total	**112**	**121**	**89**	**94**	**84**
	Percentage	**22.4%**	**24.2%**	**17.8%**	**18.8%**	**16.8%**
	Management decision impact to the ERP					
12	It is difficult to isolate decision processes, as decisions typically become interweaved with other decisions.	16	19	22	24	19
13	Many decisions do not imply distinct identifiable choices, and are difficult to pin down, in time or in place	16	17	24	24	19
14	Decision making processes do not necessarily proceed as a linear sequence of steps, rather they are driven by the emotion, imagination and memories of the decision makers	14	14	19	29	24
	Total	**46**	**50**	**65**	**77**	**62**
	Percentage	**15.33%**	**16.67%**	**21.67%**	**25.67%**	**20.67%**
	Management report generation from ERP					

No.	Description					
15	Personal administration report: report creates a list of employees who have information about their family members stored in the system	14	14	16	27	29
16	Organizational management report: This report provides an overview of all existing organizational units	16	17	19	24	24
17	Time management report: This report creates a list of the day balances, cumulated balances, or the time wage types determined by time evaluation	24	24	19	16	17
18	Payroll report: This report generates the payroll journal using existing payroll results as a base	14	19	19	24	24
19	Financial report: This report shows the payroll expenditures by cost center	14	16	22	22	26
	Total	**82**	**90**	**95**	**113**	**120**
	Percentage	**16.4%**	**18%**	**19%**	**22.6%**	**24%**
	Stakeholder reaction to ERP					
20	Inventory costs have been reduced within the company's supply chain.	16	17	24	24	19
21	Operational costs have been reduced within the company's supply chain.	19	19	14	24	24
22	On-time delivery has been improved within company's supply chain.	17	16	24	24	19
23	Accurate information is usually available for decision making.	16	17	24	24	19
24	Joint production planning and scheduling among suppliers, manufacturing, marketing, & distributors.	16	16	14	22	18
	Total	**84**	**85**	**100**	**125**	**106**

	Percentage	16.8%	17%	20%	25%	21.2%

Table 4.1: Results of the questions asked from the managers where working in manufacturing firms

For all 24 questions, increasing raw scores were computed, and then converted to percentages as shown in table 4.1. An overall result of the conceptual hypothesis is summarized in table 4.2. The raw scores for each of the 100 participants were converted to normative Minnesota Satisfaction Questionnaire (MSQ) percentages are shown in table 4.1.

Conceptual hypothesis	Strongly Disagree (%)	Disagree (%)	Undecided (%)	Agree (%)	Strongly Agree (%)
Implementation of ERP	21.67	19.67	17.83	19.5	21.33
Key things expect from ERP	22.4	24.2	17.8	18.8	16.8
Management decision impact to the ERP	15.33	16.67	21.67	25.67	20.67
Management report generation from ERP	16.4	18	19	22.6	24
Stakeholder reaction to ERP	16.8	17	20	25	21.2

Table 4.2: Conceptual hypothesis results

For all six satisfaction with implementation of ERP questions, increasing raw scores were computed, and then converted to MSQ normative percentiles. Table 4.1 is shown the overall results for all implementation of ERP questions. The raw scores for each of the 100 participants were converted to MSQ normative percentile is shown in figure 4.1. Of the participants, 21.33% had strongly agreed, 19.5% had agreed, 17.83% had undecided, 19.67% had disagreed, and 21.67% had strongly disagreed.
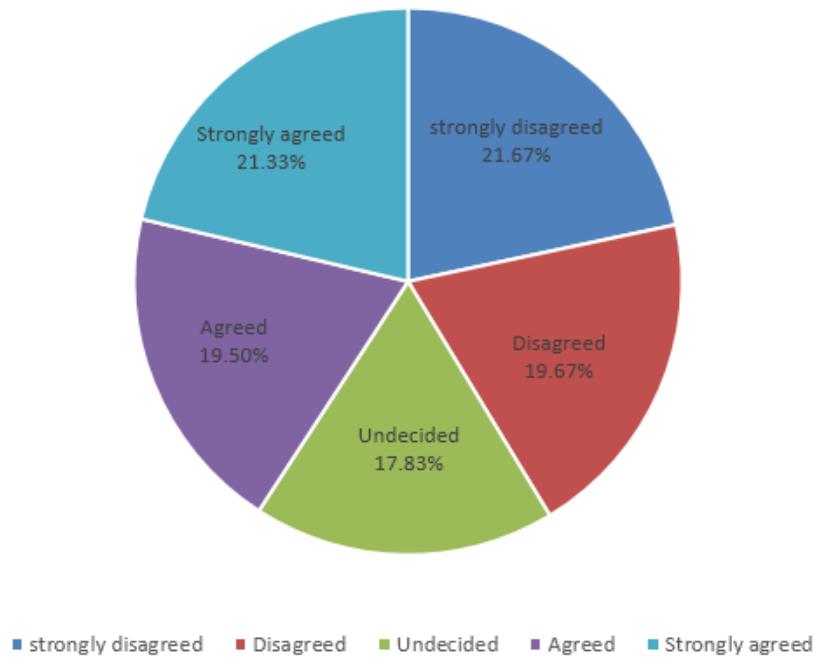
Implementation of ERP

Figure 4.1: Statistical results of implementation of ERP

For all five satisfaction with key things expect from ERP questions, increasing raw scores were computed, and then converted to MSQ normative percentiles. Table 4.1 is shown the overall results for all key things expect from ERP questions. The raw scores for each of the 100 participants were converted to MSQ normative percentile is shown in figure 4.2. Of the participants, 16.8% had strongly agreed, 18.8% had agreed, 17.8% had undecided, 24.2% had disagreed, and 22.4% had strongly disagreed.
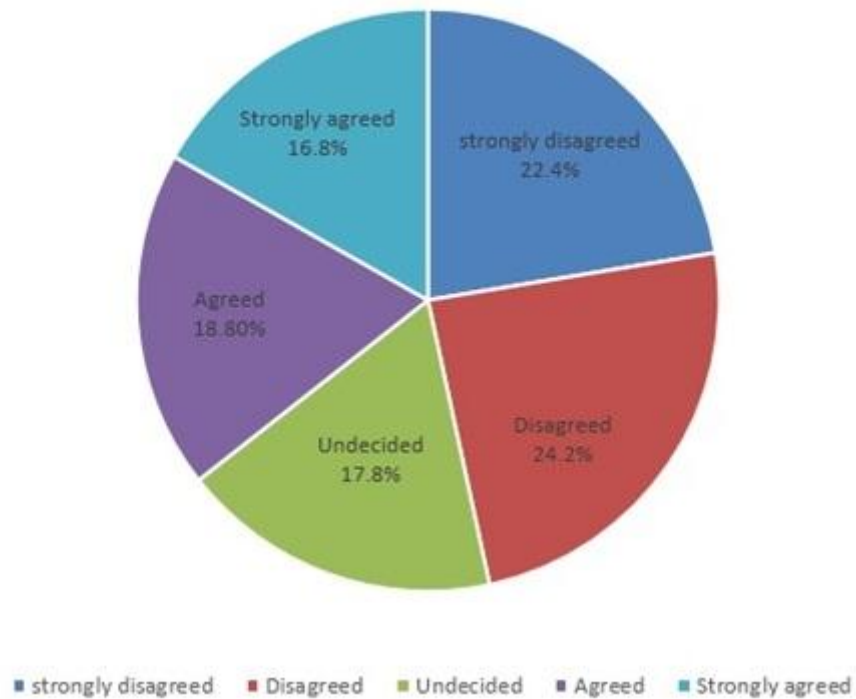
Key things expect from ERP

Figure 4.2: Statistical results of key things expect from ERP

For all three management decision impact to the ERP questions, increasing raw scores were computed, and then converted to MSQ normative percentiles. Table 4.1 is shown the overall results for all management decision impact to the ERP questions. The raw scores for each of the 100 participants were converted to MSQ normative percentile is shown in figure 4.3. Of the participants, 20.67% had strongly agreed, 25.67% had agreed, 21.67% had undecided, 16.67% had disagreed, and 15.33% had strongly disagreed.
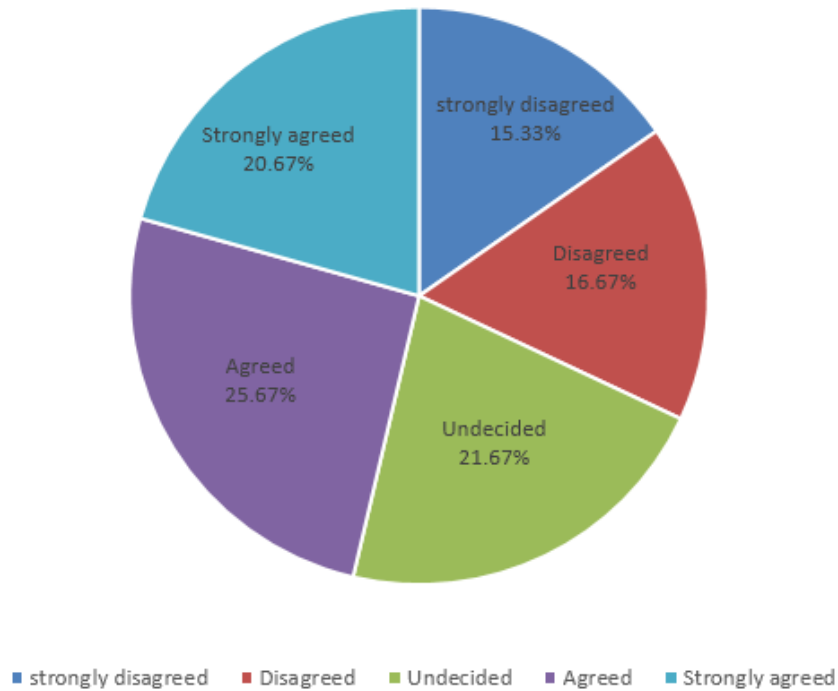
Figure 4.3: Statistical results of management decision impact to the ERP

For all five management report generation from ERP questions, increasing raw scores were computed, and then converted to MSQ normative percentiles. Table 4.1 is shown the overall results for all management report generation from ERP questions. The raw scores for each of the 100 participants were converted to MSQ normative percentile is shown in figure 4.4. Of the participants, 24% had strongly agreed, 22.6% had agreed, 19% had undecided, 18% had disagreed, and 16.4% had strongly disagreed.
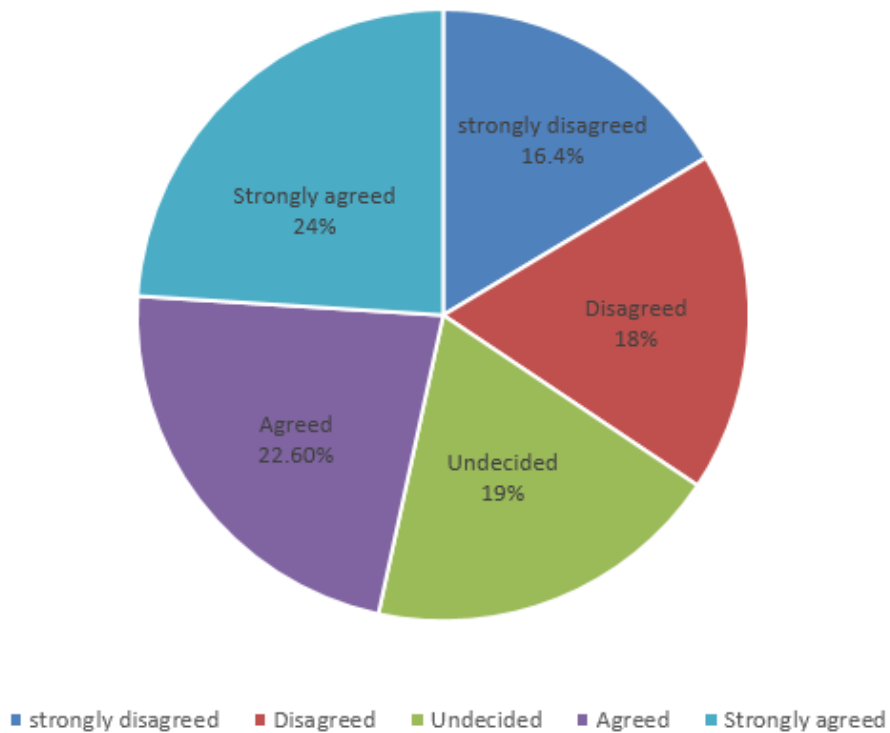
Management report generation from ERP

Figure 4.4: Statistical results of management report generation from ERP

For all five stakeholder reaction to ERP questions, increasing raw scores were computed, and then converted to MSQ normative percentiles. Table 4.1 is shown the overall results for all stakeholder reaction to ERP questions. The raw scores for each of the 100 participants were converted to MSQ normative percentile is shown in figure 4.5. Of the participants, 21.2% had strongly agreed, 25% had agreed, 20% had undecided, 17% had disagreed, and 16.8% had strongly disagreed.
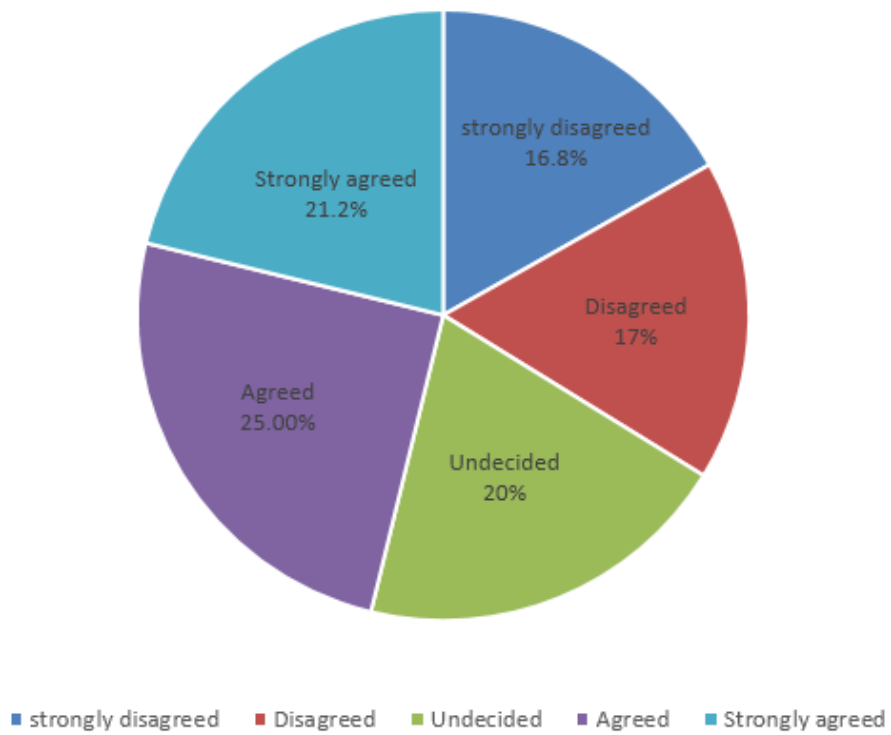
Figure 4.5: Statistical results of stakeholder reaction to ERP

Chapter 5: DATA ANALYSIS

5.1 Introduction

This chapter aims to discuss the analysis between on the area of implementation of ERP in manufacturing firms respective to other independent variable that affect the implementation of ERP in manufacturing firms in the Sri Lankan context, in order to build a conceptual framework. The data was first examined via the creation of frequency tables for categorical variables and the descriptive statistics of the continuous variables. Correlations among the variables were calculated and tabulated. Tables were prepared to show the relationship between implementation of ERP, key things expect from ERP, management decision impact to the ERP, management report generation from ERP, and stakeholder reaction to ERP. To test the five hypotheses, a full model regression followed by a stepwise regression was done.

5.2 Correlation analysis

A correlation analysis was conducted on implementation of ERP between the implementation of ERP in manufacturing firms score to attain the Pearson product moment correlation coefficient and Pearson two tailed statistic. Table 5.1 shows the results.

		Implementation of ERP	Implementation of ERP in manufacturing firms
Implementation of ERP	Pearson Correlation	1	.237
	Sig. (2-tailed)		.013
	N	100	100
Implementation of ERP in manufacturing firms	Pearson Correlation	.237	1
	Sig. (2-tailed)	.013	
	N	100	100

Table 5.1: Correlation between implementation of ERP between the implementation of ERP in manufacturing firms

A correlation analysis was conducted on key things expect from ERP between the implementation of ERP in manufacturing firms score to attain the Pearson product moment correlation coefficient and Pearson two tailed statistic. Table 5.2 shows the results.

		Key things expect from ERP	Implementation of ERP in manufacturing firms
Key things expect from ERP	Pearson Correlation	1	.313
	Sig. (2-tailed)		.730
	N	100	100
Implementation of ERP in manufacturing firms	Pearson Correlation	.313	1
	Sig. (2-tailed)	.730	
	N	100	100

Table 5.2: Correlation between key things expect from ERP between the implementation of ERP in manufacturing firms

A correlation analysis was conducted on management decision impact to the ERP between the implementation of ERP in manufacturing firms score to attain the Pearson product moment correlation coefficient and Pearson two tailed statistic. Table 5.3 shows the results.

		Management decision impact to the ERP	Implementation of ERP in manufacturing firms
Management decision impact to the ERP	Pearson Correlation	1	.253
	Sig. (2-tailed)		.000
	N	100	100
Implementation of ERP in manufacturing firms	Pearson Correlation	.253	1
	Sig. (2-tailed)	.000	
	N	100	100

Table 5.3: Correlation between management decision impacts to the ERP between the implementation of ERP in manufacturing firms

A correlation analysis was conducted on management report generation from ERP between the implementation of ERP in manufacturing firms score to attain the Pearson product moment correlation coefficient and Pearson two tailed statistic. Table 5.4 shows the results.

		Management report generation from ERP	Implementation of ERP in manufacturing firms
Management report generation from ERP	Pearson Correlation	1	.371
	Sig. (2-tailed)		.035
	N	100	100
Implementation of ERP in manufacturing firms	Pearson Correlation	.371	1
	Sig. (2-tailed)	.035	
	N	100	100

Table 5.4: Correlation between management report generations from ERP between the implementation of ERP in manufacturing firms

A correlation analysis was conducted on stakeholder reaction to ERP between the implementation of ERP in manufacturing firms score to attain the Pearson product moment correlation coefficient and Pearson two tailed statistic. Table 5.5 shows the results.

		Stakeholder reaction to ERP	Implementation of ERP in manufacturing firms
Stakeholder reaction to ERP	Pearson Correlation	1	.267
	Sig. (2-tailed)		.073
	N	100	100
Implementation of ERP in manufacturing firms	Pearson Correlation	.267	1
	Sig. (2-tailed)	.073	
	N	100	100

Table 5.5: Correlation between stakeholder reactions to ERP between the implementation of ERP in manufacturing firms

An overall result of the Pearson product moment correlation is summarized in table 5.6.

Conceptual hypothesis	Pearson product moment correlation	P- value
Implementation of ERP	0.237	0.013
Key things expect from ERP	0.313	0.73
Management decision impact to the ERP	0.253	0.000
Management report generation from ERP	0.371	0.035
Stakeholder reaction to ERP	0.267	0.073

Table 5.6: Overall correlation results

As anticipated, there are positive correlations between all independent variables. However, one of these correlations were significant except key things expect from ERP. The strongest positive relationships between the implementation of ERP in manufacturing firms is the implementation of ERP. Also moderate positive relationships between implementation of ERP in manufacturing firms is the Management report generation from ERP.

5.3 Regression analysis

To test the hypotheses, a full model linear regression was run in which all the variables were used along with dummy variables for. The results are presented in Table 5.7 along with the Analysis of variance (ANOVA) giving the square of correlation (R^2), F, and the significance of the regression. The R^2 indicates how much of the variance is explained by the regression model as shown in Table 5.7.

Independent variables	Standard coefficient	Standard deviation error	t	R^2	p-value	F change
Implementation of ERP	0.269	0.547	2.963	0.082	0.040	8.781
Key things expect from ERP	-0.236	0.808	-2.408	0.046	0.596	5.797
Management decision impact to the ERP	-0.131	0.961	-1.157	0.017	0.003	1.708
Management report generation from ERP	0.044	1.035	0.440	0.002	0.062	0.194
Stakeholder reaction to ERP	-0.436	0.81	-4.789	0.190	0.157	22.938

Table 5.7: ANOVA analysis of the regression

Implementation of ERP in manufacturing firm depends upon implementation of ERP; refer to figure 5.1 for a linear regression analysis of this data reveals a linear relationship. The coefficient of determination, R^2, is about 8.2%, which means that 8.2% of the changeability in implementation of ERP level is explained by this equation. This indicates a strong positive linear relationship of implementation of ERP in manufacturing firm as a function of implementation of ERP.
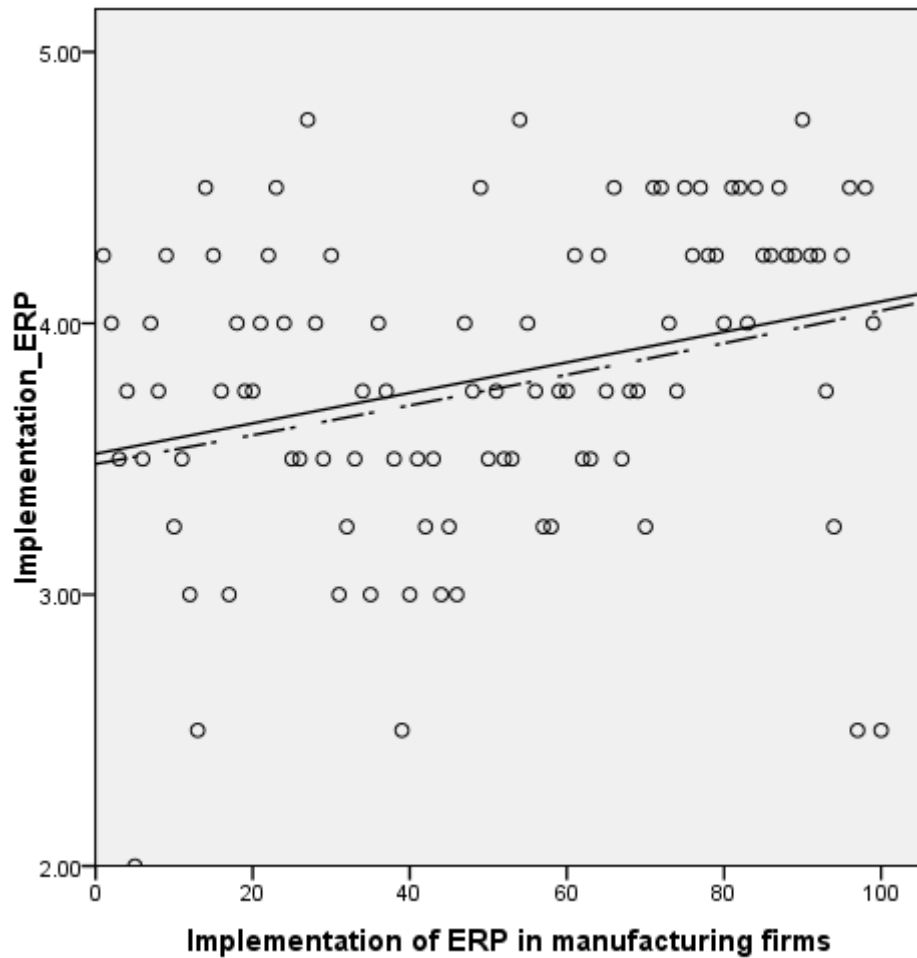
Figure 5.1: ANOVA analysis of the regression between implementation of ERP in manufacturing firms depends upon implementation of ERP

Implementation of ERP in manufacturing firm depends upon key things expect from ERP; refer to figure 5.2 for a linear regression analysis of this data reveals a linear relationship. The coefficient of determination, R^2, is about 4.6%, which means that 4.6% of the changeability in key things expect from ERP level is explained by this equation. This indicates a strong negative linear relationship of implementation of ERP in manufacturing firm as a function of key things expect from ERP.
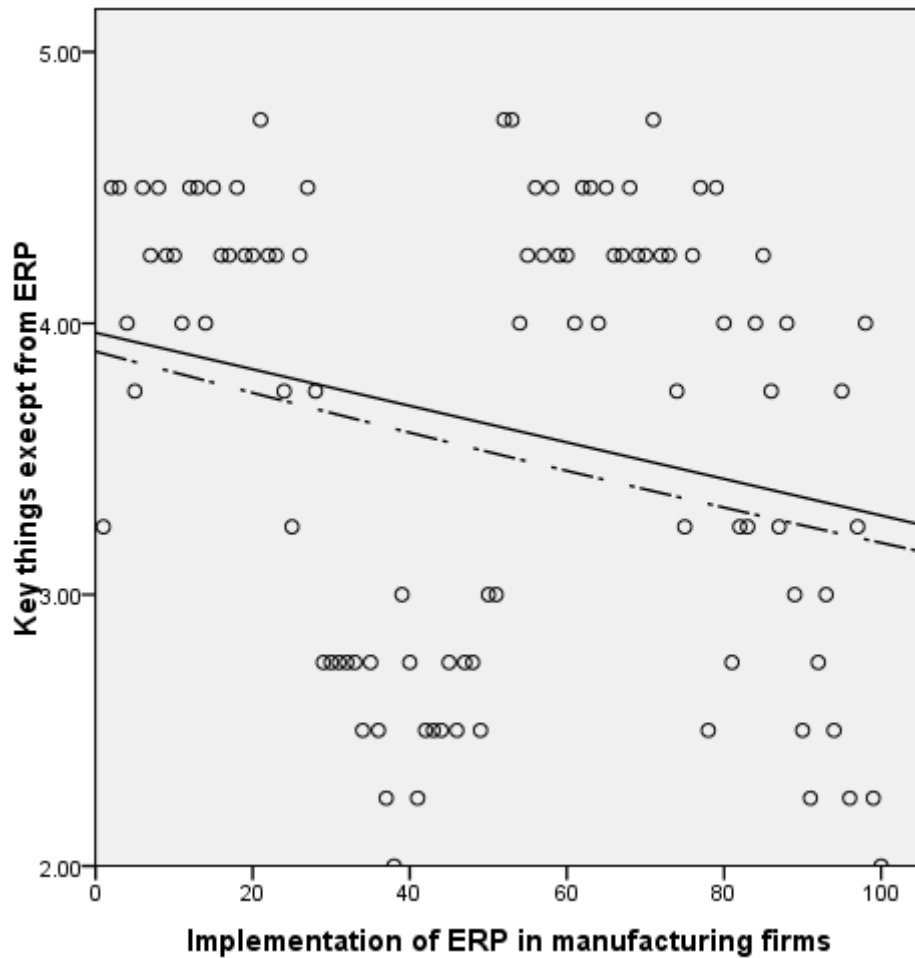
Figure 5.2: ANOVA analysis of the regression between implementation of ERP in manufacturing firms depends upon key things expect from ERP

Implementation of ERP in manufacturing firm depends upon management decision impact to the ERP; refer to figure 5.3 for a linear regression analysis of this data reveals a linear relationship. The coefficient of determination, R^2, is about 1.7%, which means that 1.7% of the changeability in management decision impact to the ERP level is explained by this equation. This indicates a strong negative linear relationship of implementation of ERP in manufacturing firm as a function of management decision impact to the ERP.
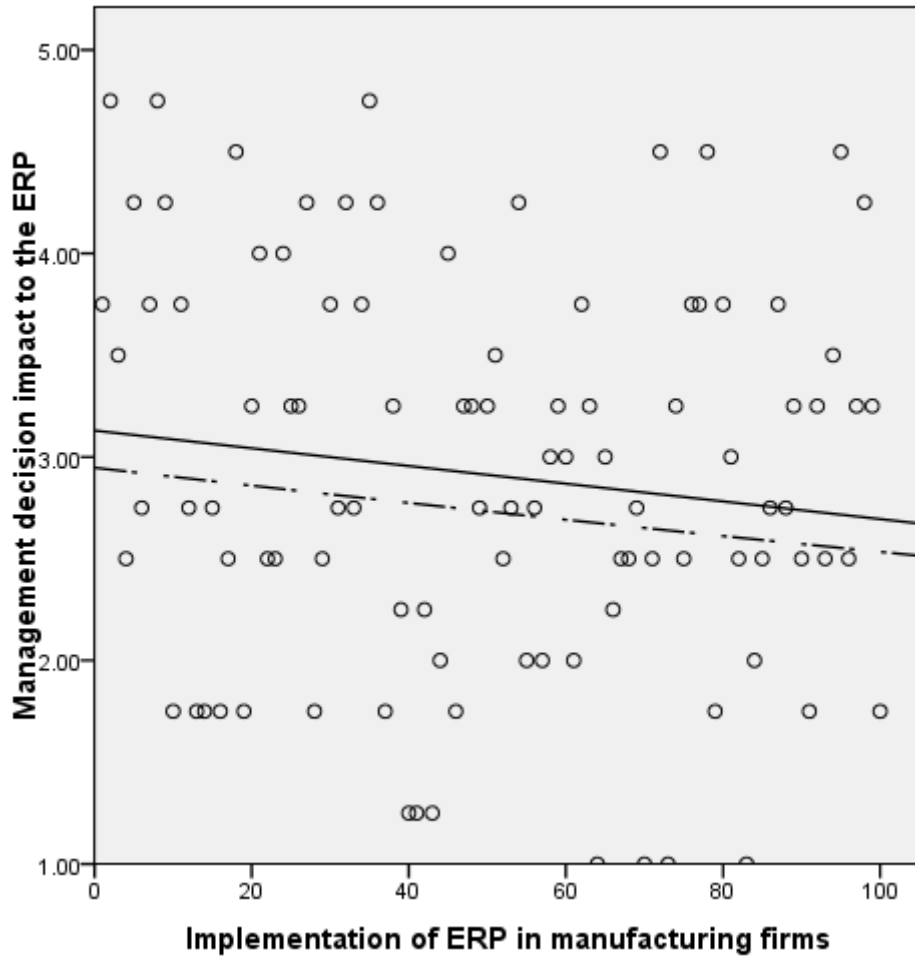
Figure 5.3: ANOVA analysis of the regression between implementation of ERP in
manufacturing firms depends upon management decision impact to the ERP

Implementation of ERP in manufacturing firm depends upon management report
generation from ERP; refer to figure 5.4 for a linear regression analysis of this data
reveals a linear relationship. The coefficient of determination, R^2, is about 0.2%,
which means that 0.2% of the changeability in management report generation from
ERP level is explained by this equation. This indicates a positive linear relationship of
implementation of ERP in manufacturing firm as a function of management report
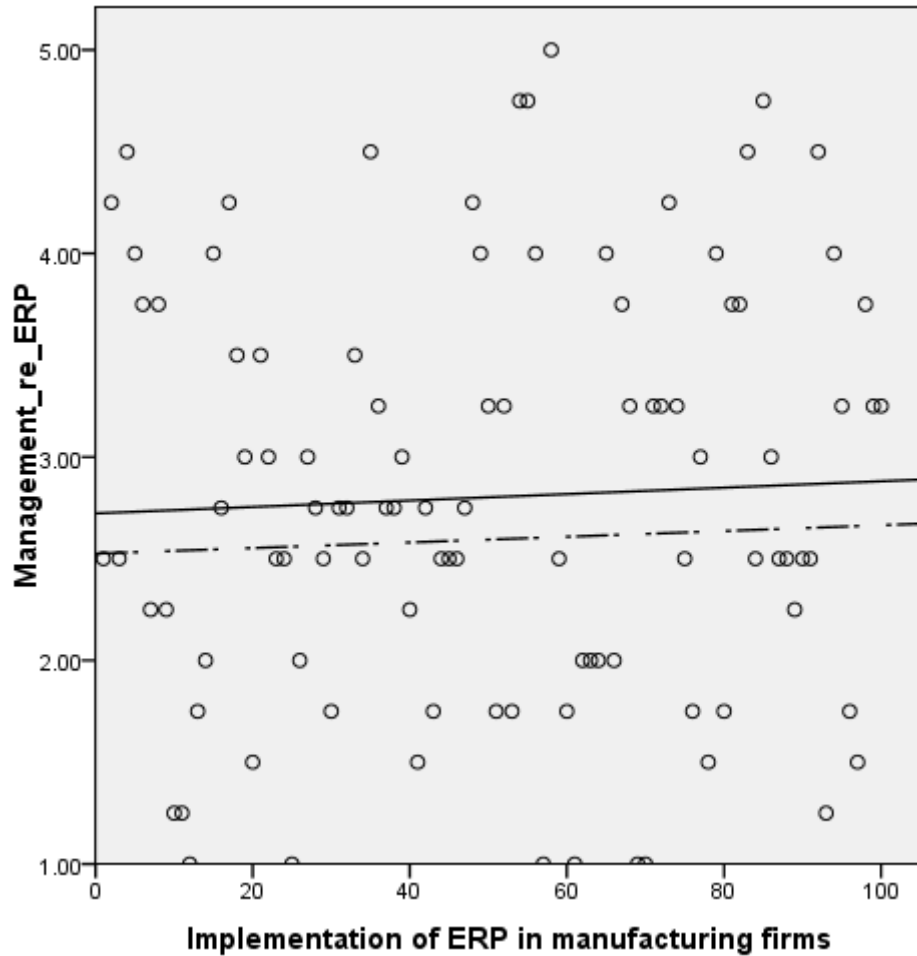generation from ERP.

Figure 5.4: ANOVA analysis of the regression between implementation of ERP in manufacturing firms depends upon management report generation from ERP

Implementation of ERP in manufacturing firm depends upon stakeholder reaction to ERP; refer to figure 5.5 for a linear regression analysis of this data reveals a linear relationship. The coefficient of determination, R^2, is about 19%, which means that 19% of the changeability in stakeholder reaction to ERP level is explained by this equation. This indicates a strong negative linear relationship of implementation of ERP in manufacturing firm as a function of stakeholder reaction to ERP.
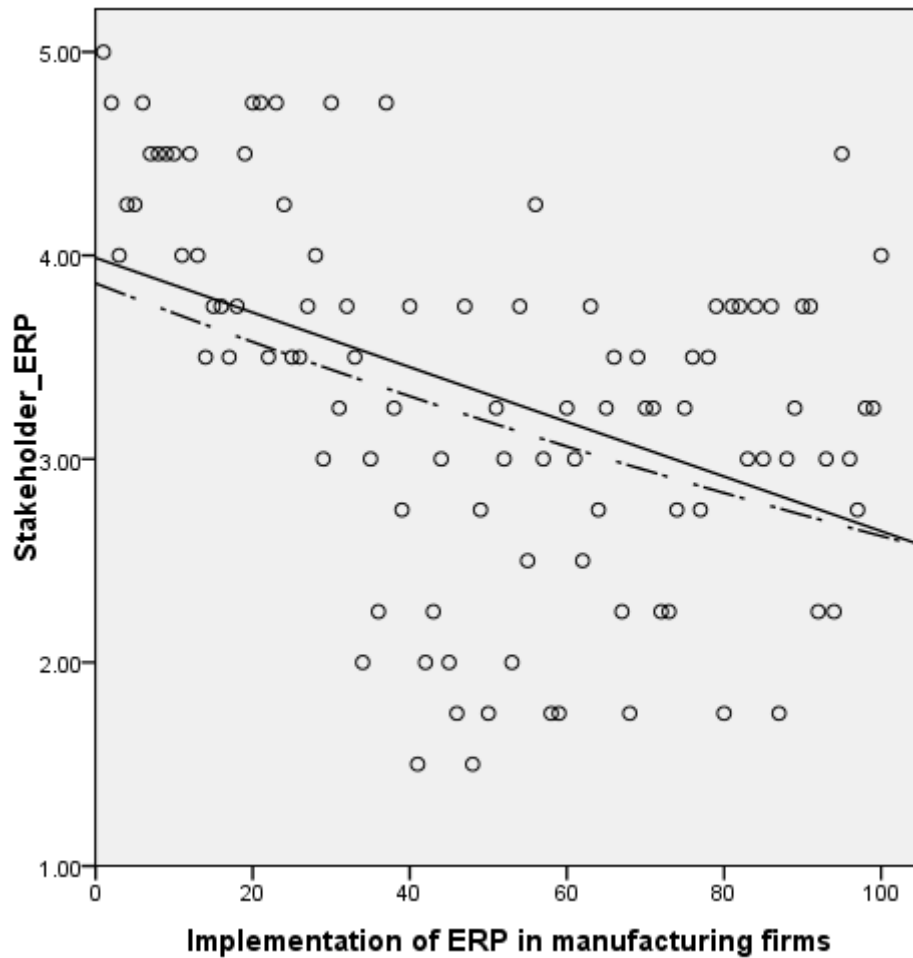
Figure 5.5: ANOVA analysis of the regression between implementation of ERP in manufacturing firms depends upon stakeholder reaction to ERP

5.4 Research hypothesis and findings

The following research hypotheses were addressed; each is followed by the study's findings:

5.4.1 **Hypothesis I (H$_1$):** Lack of implementation of ERP positively influences the implementation of ERP in manufacturing firms in Sri Lanka.

Hypothesis I was there a significant difference in implementation of ERP in manufacturing firms among implementation of ERP in manufacturing firms in Sri Lanka. Study results indicated that implementation of ERP in manufacturing firms depended strongly positive relationship on implementation of ERP; implementation of ERP in manufacturing firms increased strongly. A linear regression model was shown

in figure 5.1 the most appropriate regression model for implementation of ERP in manufacturing firms as an implementation of ERP.

5.4.2 **Hypothesis II (H$_2$):** In-accuracy of key things expect from ERP positively influences the completion of implementation of ERP in manufacturing firms in Sri Lanka.

Hypothesis II was there a significant difference in implementation of ERP in manufacturing firms among key things expect from ERP of implementation of ERP in manufacturing firms in Sri Lanka. Study results indicated that key things expect from ERP in manufacturing firms depended strong negative relationship on key things expect from ERP; key things expect from ERP in manufacturing firms increased strongly. A linear regression model was shown in figure 5.2 the most appropriate regression model for implementation of ERP in manufacturing firms as a key things expectt from ERP.

5.4.3 **Hypothesis III (H$_3$):** Lack of management decision impact to the ERP positively influences the completion of implementation of ERP in manufacturing firms in Sri Lanka.

Hypothesis III was there a significant difference in implementation of ERP in manufacturing firms among management decision impact to the ERP of implementation of ERP in manufacturing firms in Sri Lanka. Study results indicated that key things expect from ERP in manufacturing firms depended strong negative relationship on management decision impact to the ERP; management decision impact to the ERP in manufacturing firms increased strongly. A linear regression model was shown in figure 5.3 the most appropriate regression model for implementation of ERP in manufacturing firms as a management decision impact to the ERP.

5.4.4 **Hypothesis IV (H$_4$):** Lack of management report generation from ERP positively influences the completion of implementation of ERP in manufacturing firms in Sri Lanka.

Hypothesis IV was there a significant difference in implementation of ERP in manufacturing firms among management report generation from ERP of

implementation of ERP in manufacturing firms in Sri Lanka. Study results indicated that key things expect from ERP in manufacturing firms depended positive relationship on management report generation from ERP; management report generation from ERP in manufacturing firms increased strongly. A linear regression model was shown in figure 5.4 the most appropriate regression model for implementation of ERP in manufacturing firms as a management report generation from ERP.

5.4.5 **Hypothesis V (H_5):** Lack of stakeholder reaction to ERP positively influences the completion of implementation of ERP in manufacturing firms in Sri Lanka.

Hypothesis V was there a significant difference in implementation of ERP in manufacturing firms among stakeholder reaction to ERP of implementation of ERP in manufacturing firms in Sri Lanka. Study results indicated that key things expect from ERP in manufacturing firms depended strong negative relationship on stakeholder reaction to ERP; stakeholder reaction to ERP in manufacturing firms increased strongly. A linear regression model was shown in figure 5.5 the most appropriate regression model for implementation of ERP in manufacturing firms as a stakeholder reaction to ERP.

DISCUSSION AND CONCLUSION

To answer research questions to conduct this whole study from theoretical and industrial practices perspective. The acceptable achieving total implementation of ERP in manufacturing firms where selected manufacturing industries in Sri Lankan context. During the research observed manufacturing firms had more than 20% of each independent variables are impacts negatively on company's worth.

The planned and actual use of ERP systems is universal in the manufacturing sector in Sri Lanka, with both small and large companies implementing or planning to implement an ERP system. This is in line with the literature that ERP systems are gaining increasing attention from small-to medium-sized companies. Although cost and time required to implement an ERP system does not seem to justify the benefits it can achieve, ERP seems to be increasing in importance and is not just a passing fashion. The move to a packaged ERP system represents a greater resource commitment for small companies, with larger companies taking advantage of economies of scale. There is a common core of functional modules for manufacturing companies that have been implemented most frequently, with some customization required.

ERP implementations include changes in most business processes and day-to-day transactions. Implementation project failure leads to a crash of the entire business. The factors discussed should be analyzed when a company decides to implement ERP so that prerequisites are identified. Selection of wrong ERP package and unrealistic expectations often lead to conflict between the organization and vendor. ERP Solutions offer positive return of investments if the business processes are adapted according to best practices. Organizations should consider this fact and opt for customization only in case where they feel their business strategy is more effective than standardization offered by ERP. Most implementation projects focus only on technical factors but neglect the importance of the non-technical factors like project management, training and resistance to change. Training of employees to work with the new ERP system is also important to get the maximum benefit from the various functionalities provided by the software.

ERP systems are multi-module application software that helps enterprises manage their important processes, including production planning, purchasing, inventory management, supplier's management, etc. ERP systems facilitate the exchange of data among divisions. Consequently, ERP systems can reduce production and inventory costs, production demand and forecasting, among others. Nevertheless, the costs involved in such a large-scale investment are only justifiable if a good understanding on what to implement, how to implement and all pre-ERP implementation are clear. ERP systems are an expensive investment for a company and failure to thoroughly investigate an ERP system before implementation could have serious implications for a business. Like any projects, ERP systems implementation has their drawback such as cost, time, etc. and success is highly dependent on commitment form senior management.

In this study, some of the implementation experiences have been identified, but further investigations are required. From the data collected, it seems that some of the benefits from an ERP system have not been realized, the reasons for this are not obvious. This survey covers relatively large-sized companies: ERP vendors are now targeting small businesses. Future investigations may be carried out to investigate the impact of ERP in small companies. In addition, a model on the adoption of ERP can be developed based on these surveys afterwards.

REFERENCES

Abbas, M. (2011). ERP Systems in HEI Context from a Multiple Perspective View: A Case Study

Dover, C. (2012). Worldwide enterprise resource management applications 2012–2016 forecast and 2011 vendor shares. (MARKET ANALYSIS No. 238476, Volume: 1. IDC.

Chaudhry, B., Wang, J., and Wu, S. (2006). Impact of health information technology on quality, efficiency, and costs of medical care. Annals of Internal Medicine, pp. 742–752.

Helo, P., Anussornnitisarn, P., and Phusavat, K. (2008). Expectation and reality in ERP implementation: Consultant and solution provider perspective. Industrial Management & Data Systems, 108(8), pp. 1045-1059.

Hanafizadeh, P., and Ravasan, A. Z. (2011). A McKinsey 7S model-based framework for ERP readiness assessment. International Journal of Enterprise Information Systems, pp. 7- 23.

Chan, H.K. and Chan, F.T.S. (2010), "Comparative study of adaptability and flexibility in distributed manufacturing supply chains", Decision Support Systems, Vol. 48 No. 2, pp. 331-41.

Forslund, H. (2010), "ERP systems' capabilities for supply chain performance management", Industrial Management & Data Systems, Vol. 110 No. 3, pp. 351-67.

Maditinos, D., Chatzoudes, D. and Tsairidis, C. (2012), "Factors affecting ERP system implementation effectiveness", Journal of Enterprise Information Management, Vol. 25 No. 1, pp. 60-78.

Rom, A. and Rohde, C. (2006), "Enterprise resource planning systems, strategic enterprise management systems and management accounting: a Danish study", Journal of Enterprise Information Management, Vol. 19 No. 1, pp. 50-66.

Navo, S., Wade, and M. R. (2010), The formation and value of IT-enabled resources: Antecedents and consequences of synergistic relationships. MIS Quarterly, pp. 163-183.

Stoel, M.D., and Muhanna, W.A. (2009), IT capabilities and firm performance: A contingency analysis of the role of industry and IT capability type. Information & Management, pp. 181-189.

Ramirez, R., Melville, N, and Lawler, E. (2010) Information technology infrastructure, organizational process redesign, and business value: An empirical analysis. Decision Support Systems, pp. 417-429.

Gattiker, T. F., and Goodhue, D. L., (2004) Understanding the local-level costs and benefits of ERP through organizational information processing theory. Information & Management, pp. 431-443.

Palaniswamy, R. and Tyler, F. (2000). Enhancing Manufacturing Performance with ERP Systems, Information Systems Management, pp. 17- 43.

Kemp, M.J. and Low, G.C. (2008), "ERP innovation implementation model incorporating change management", Business Process Management Journal, Vol. 14 No. 2, pp. 228-42.

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

Marnewick, C., and Labuschagne, L. (2005). A conceptual model for enterprise resource planning (ERP). Information Management & Computer Security, 13(2), pp. 144-155.

Light, B. and E. L. Wagner (2006). "Integration in ERP Environments: Rhetoric, Realities and Organizational Possibilities." New Technology, Work and Employment 21(3): pp. 215-228.

Kumar, V., Maheshwari, B. and Kumar, U. (2003). An Investigation of Critical Management Issues in ERP Implementation: Empirical Evidence from Canadian Organisations. Technovation, Vol. 23, Issue 10, pp. 793-807.

Kalling, T. (2003). ERP Systems and the Strategic Management Processes that Lead to Competitive Advantage. Information Resources Management Journal, Vol. 16, Issue 4, pp. 46-67.

Beheshti, H.M. and Beheshti, C.M. (2010), "Improving productivity and firm performance with enterprise resource planning", Enterprise Information Systems, Vol. 4 No. 4, pp. 445-72.

Kallunki, J.-P., Laitinen, E.K. and Silvola, H. (2011), "Impact of enterprise resource planning systems on management control systems and firm performance", International Journal of Accounting Information Systems, Vol. 12 No. 1, pp. 20-39.

Kamhawi, E.M. (2007), "Critical factors for implementation success of ERP systems: an empirical investigation from Bahrain", International Journal of Enterprise Information Systems, Vol. 3 No. 2, pp. 34-49.

Questionnaire

	State	Strongly Disagree	Disagree	Undecided	Agree	Strongly Agree
Why fully ERP implementation is not practical?						
1	Adequate and correct data should be provided it had to be collected from the distributed servers					
2	Training and testing of the system should be done properly by the ERP consultants					
3	Precision in management objectives and expectations from the ERP system are clearly stated to the vendors					
4	Observation the completion of ERP training provided to the staff and within some days of the system going live, many of the trainees from the organization quit					
5	Customization services involves any modifications or extensions that change how the ERP system works					
6	Stakeholders are all those who are directly or indirectly affected by a company implementing any new ERP system be it organizations like those of the supplier as well as the vendors					
What are the key things you expect from ERP?						
7	It will be helpful before considering implementing to talk to an expert.					
8	Choosing the right product is also expected to be a hard decision to make.					
9	Getting an ERP system up and running can take approximately six months up to 2					

	years.					
10	Data migration is another significant risk that you should evaluate in depth.					
11	The right software suite is one thing, the right implementation partner is entirely another.					
	Is it ERP making impacts for management decisions?					
12	It is difficult to isolate decision processes, as decisions typically become interweaved with other decisions.					
13	Many decisions do not imply distinct identifiable choices, and are difficult to pin down, in time or in place					
14	Decision making processes do not necessarily proceed as a linear sequence of steps, rather they are driven by the emotion, imagination and memories of the decision makers					
	What type of management reports generates from ERP?					
15	Personal administration report: report creates a list of employees who have information about their family members stored in the system					
16	Organizational management report: This report provides an overview of all existing organizational units					
17	Time management report: This report creates a list of the day balances, cumulated balances, or the time wage types determined by time evaluation					
18	Payroll report: This report generates the payroll journal using existing payroll results as a base					

19	Financial report: This report shows the payroll expenditures by cost center					
What are the different stakeholder's reactions to ERP?						
20	Inventory costs have been reduced within the company's supply chain.					
21	Operational costs have been reduced within the company's supply chain.					
22	On-time delivery has been improved within company's supply chain.					
23	Accurate information is usually available for decision making.					
24	Joint production planning and scheduling among suppliers, manufacturing, marketing, & distributors.					