IMPACT OF ERP IMPLEMENTATION SUCCESS ON ORGANISATIONAL STRUCTURE IN THE MANUFACTURING SECTOR

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Thesis submitted in partial fulfillment of the requirements for the degree Master of Engineering in Manufacturing Systems Engineering

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DECLARATION

I hereby declare that this is my own work and this thesis 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.

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ABSTRACT

In the modern competitive manufacturing context, many organisations are willing to eliminate non-value adding tasks, reduce the cost of production and hence to improve the overall value of the supply chain, for better prospects to accomplish higher profit margins.

When operations gets complex and the industry gets broader, conventional ways do not help organisations to manage their information flow efficiently, so to fulfil this requirement, most of the organisations implement ERP tools.

As far as management processes are concerned, "Organising" is the most important element. As the most valuable asset of any organisation is the human resource, it is obvious that the organisational structure is most important when organizing resources. Therefore it is important to study the impact of the implementation success of the ERP systems on the organisational structure as in modern context, many of the top managers are always willing to cut down human resources by alternative means such as automation.

Through the Literature survey it was found that, effort in studying the impact on the organisational structures by ERPs was week especially in the Sri Lankan context. Therefore the study focused on exploring the impact of the ERP implementation success on the organisational structures in Sri Lankan manufacturing organisations.

During the study, five organisations were selected in similar scale, where ERPs in similar scope, have been implemented. It was carried out as a quantitative study and the implementation success and the perceived level of impact on the organisational structure were measured based on data gathered through questionnaires distributed among end users of ERP (n=89). Data was analysed using SPSS V16.0.

The results depicted that the level of success of ERP implementations were high, but the level of impact on the organisational structure by ERPs was not significant and hardly visible. The most impacted element of the structure was "Departmentalisation" but with low significance.

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CHAPTER 01 – INTRODUCTION

1.0 Background of the research

A business organisation must offer better value in the areas of quality, service, technological expertise and total cost to keep the customers satisfied and earn their trust and business and the continuous improvement in all areas is needed to remain competitive and maintain the sustainability of the organisation as mentioned in [1]. In the modern manufacturing context, all the industries are highly focusing on reducing time to market by eliminating non-value adding tasks and reducing cost of production in their operation to accomplish a better competitive advantage in the globalised competitive economy in the world. The economy governs the price rather than the manufacturer in the modern global industries and context.

However, reduction of the cost of production is the best way of increasing the profit margin that remains to be managed by the manufacturer. Therefore, efficient ways and means of material flows and accurate and quality information flows are very much essential in manufacturing operations. These things help in optimizing the value network across the industry hence accomplishing low cost of production with expected quality.

Technology plays a key role in today's business environment and many companies greatly rely on computers and software to provide accurate information to effectively manage their business as mentioned in [2]. Therefore, it is becoming increasingly necessary for all businesses to incorporate information technology solutions to operate successfully.

Enterprise Resource Planning (ERP) is one of the most appropriate software technologies in accomplishing overall efficiencies in the operations of the organisations, which also help reducing non-value adding activities of the operation.

It also emphasises business transformation, which will lead to process changes in its effort to maximize the benefits of organisations. Among many different definitions for ERPs, by [3], as mentioned in [4] has defined that the Enterprise Resource Planning (ERP) System as a generic term for a broad set of activities supported by multi module application software that helps organisations to manage their resources.

However, some companies do not get the intended benefits by implementing these systems while some are benefitting strategically. High failure rate in implementing ERP systems have been widely cited in the literature (According to [5] as cited in [6]). Some reasons for ERP failures are over budgets, not reaching the defined benefits and not meeting project deadlines. Meeting deadlines may also lead failures as implementers leave minor points aside having intention to review later, after major areas are covered, to save time. Normally that leads to make the left minor points to be skipped and forgotten, resulting in not covering the whole process of the organisation which has been initially decided, during the process mapping phase.

The impact of the ERP in a company has been identified by researchers based on different classifications. Accordingly the impact of ERP has been classified based on tangibility or intangibility, based on different levels of the organisation as individual, group and organisation (According to [7] as cited in [8]), and as strategic and tactical impact [8].

Studies have also been carried out to assess the impact of ERP implementation on organisational accounting systems according to [9], post implementation change (According to [10]), organisational effectiveness (According to [11]), and in many areas.

However, with respect to Sri Lanka there is not much researches done on the area of the impact of ERP implementation when compared to that in other countries. In the present study, the focus is on a quantitative study on the impacts of implementation of ERP systems on organisational structure of selected large scale manufacturing organisations in Sri Lanka.

1.1 Identification of the research problem

The research problem of the study is, what is the impact of the successful implementations of Enterprise Resource Planning (ERP) systems on organisational structure of organisations in manufacturing sector?

1.2 Research objectives

Following are the objectives of the study.

1. To understand whether the ERP is implemented successfully in the selected manufacturing organisations meeting the expected benefits and performances from the ERP system.

2. To study the degree of change in the organisational structure of the selected organisations with the success of the implementation of the ERP.

3. To evaluate the highly impacted element of the organisational structure of the selected organisations with the ERP implementation success.

1.3 Significance of the study/ the research gap

In this study, the impact on or how the structure of an organisation would change upon the success of an implementation of an Enterprise Resource Planning (ERP) system was studied. The study mainly focused on selected companies in the manufacturing sector, in the Sri Lankan context. The study was based on a conceptual model developed with the available literature related to ERP system implementation and organisational structure. Accordingly, the conceptual framework is having two variables as dependent variable and independent variable.

During the study, the successfulness of the implementation was considered as the independent variable and the impact on the respective elements of the organisational structure as the dependent variable.

1.3.1. Importance of ERP systems

Any organisation, when it grows will come to a stage where no more manual activities will be efficiently and effectively possible from that point onwards. The main reason for this is the heavy information load relating to customers, suppliers, inventory management, production planning and scheduling and many other business related activities which have been created along with the growth of the organisation.

Organisations that have not properly implemented ERP systems for their activities may be running with manual systems (with manual documents and forms) or with many kinds of in-house developed or purchased software components which are running with isolated databases within the organisation. In most of such situations these isolated software serve only to some selected departments, such as for finance, procurement, sales and marketing, planning and sourcing and so on and information flow is on manual base across the departments in the organisation. Therefore there is no any integration of information and this will be negatively affecting the optimum functionality of the business activities of the organisation. The organisation will function on less efficiency and less effectively, so slow growth of the organisation.

Successful ERP implementation will bring the integrity of information among the departments very efficiently and effectively as it is having a central data base for all of the modules which are integrated and working interactively. A powerfully integrated ERP system enables interactions of marketing, sales, quality control, products processes, supply lines, production, stocks and many other areas because all are in a single database. Therefore it integrates all departments and functions across the organisation in a single computer system which enables to serve all those different departments' particular needs. Also the processing power and the analytical power will work hand in hand with the relevant stakeholders of the organisation and help them to make decisions optimally in both planning decisions and strategic decisions. Material Requirement Planning (MRP), Production planning and scheduling, Business Intelligence (BI) are some of the modules of the ERP systems which will help in planning and effective decisions. Also it will reduce many of the

non-value adding activities of the business such as manual document handling, manual data processing (upload and download) from earlier isolated software, duplication of data, many number of data entry points for the same data, human errors which can occur when planning and managing load of information and constraints manually which are spread all over the organisation and so on. As a result of this the efficiency of the organisation will be increased.

Furthermore it is possible to integrate the customers and suppliers so that the total integration over the value chain can be done. This will reduce the cost of productions of goods, reduce the inventory of the organisation, reduce shortages of inventory for production, improve replenishments of customer stocks eliminating shortages and finally it will help to achieve high profitability for the organisation and best prices for the customers.

1.3.2. Nature of the organisations

In this study, four large-scale organisations were selected. Those are MAS Holdings (Pvt) Limited, Unilever Sri Lanka Limited, Haycarb PLC and Noratel International (Pvt) Limited. Except Noratel International (Pvt) Limited, all other organisations are having the same ERP system implemented which is SAP ERP. SAP ERP could be considered as the world's top ranked ERP system in customer wise in both service and manufacturing sectors. All these organisations are having SAP implemented in their businesses for more than five years. Noratel International (Pvt) Limited has implemented an ERP system which is Infor Syteline. It is also a world recognized ERP from Infor Global Solutions and it could be considered as the product wise world's top ranked ERP solutions provider. Noratel International (Pvt) Limited also has Infor Syteline implemented in their business for more than five years. Also all these five organisations are having around 200 'named' users of the ERP system and an average of 250 staff members.

1.3.3. Focus of the study

The focus of the study was mainly to understand the change of the organisation structure upon implementing an ERP system in the selected organisations. It is also aimed to relate the success of the implementation of the ERP with the change in the organisation structure. In the Sri Lankan context there is no such similar study has been carried out and therefore there is a potential benefit in doing research in this area in the Sri Lankan context.

1.4 Limitations of the study

Even though the attempt was done to get the best result from the study, there will still be some limitations of the study which would make the results to have a mat finish rather than a smoothed finish. Some of the points are given below.

i. Implementation success was measured using only two dimensions of this study. There may be several other dimensions but they are not considered.

ii. As a questionnaire was used in order to collect data there may have been some inherent limitations of this questionnaire method.

iii. In this study, a non-probability convenient sampling method was used. There are some inherent limitations of this method also.

iv. Even though a formal structure is defined in the process of organizing in any organisation, there would be some informal structures prevailing in those organisations. In this study informal structures of organisations was not considered. Therefore the hidden part has not been reflected properly during the study which would have changed the shape of the result of the study.

1.5 Thesis overview

i. Chapter 1: Chapter 1 of this report describes the introduction of the study

ii. Chapter 2: Chapter 2 of this report describes the literature review of the study

iii. Chapter 3: Chapter 3 of this report describes the research methodology used in this study

iv. Chapter 4: Chapter 4 of this report describes the data analysis and presentation

v. Chapter 5: Chapter 5 of this report discusses the results which are obtained in Chapter 4

vi. Chapter 6: Chapter 6 of the report describes the conclusion and recommendation of the study with managerial implications

CHAPTER 02 - LITERATURE REVIEW

2.1 ERP systems in organisations

In the literature review, it was mainly focussed on ERP and organisational structure as those are the independent variable and the dependant variable of the study.

2.1.1 Defining ERP systems

As found in much literature, Enterprise Resource Planning systems are not having a specific definition or an universally accepted definition. Different authors and scholars have defined ERPs differently.

According to [12] an ERP system is an integrated, configurable and customizable information system which plans and manages all the resources in the enterprise, streamlines and incorporates the business processes within and across the functional or technical departments in the organisation (According to [12] as cited in [13]).

However, some authors have defined ERP systems in a narrow way limiting it as set of computer application software. Accordingly [3] (as cited in [04]) states that the Enterprise Resource Planning (ERP) System is a generic term for a broad set of activities supported by multi module application software that helps organisation to manage their resources.

As mentioned in [7] it defines an ERP system as a packaged business software system that enables a company to manage the efficient and effective use of resources (materials, human resources, finance, etc.) by providing a total, integrated solution for the organisation's information processing needs.

According to [14] as cited in [15] it defines ERP systems as configurable information systems packages that integrate information and information-based processes within and across functional areas in an organisation.

2.1.2 The impact of ERPs on organisational structure

According to [16] it is certain that, the implementation of ERP systems will result in changes to some or all processes and potentially changes to job roles, responsibility, departmental boundaries, and organisational structure.

Quoting a study done in Air Products and Chemicals, Inc. in Pennsylvania, [16] has stated that under the factors that contributed to successful SAP (SAP would be considered as the world's most recognized ERP system) implementation, strong governance structure and processes, which includes senior management participation in implementation and engaging well with the SAP and implementation partner.

Regardless of the various benefits of the ERP system, its adoption and implementation have not been without difficulties. High failure rate in implementing ERP systems have been widely cited in the literature (According to [5] as cited in [6]). For example [17] (as cited in [18]) stated that over 90% of ERP implementations have been delayed and budget needed for the additional amounts.

According to the 2009 edition of the Standish Group report (as cited in [19]), 32% of all IT projects were completed on time, on budget and the software delivered the required level of functionality. However, as many as 44% of the projects were over budget or late, and 24% of them were terminated before completion or were not utilized after their implementation.

According to different studies, a lot of ERP projects do not reach the expected results or lead to the failure of the project. The study of [20] (as cited in [13]), for example, listed 117 companies which implemented ERP and had the following results: 25 percent of all the projects were out of budget, 20 percent of the projects were abruptly discontinued for various reasons, and 40 percent of the remaining 55 percent

stated that they did not reach the defined goals within one year after the official project ended.

2.1.3 ERP implementation success

Various factors may influence the ERP implementation success, such as: organisation maturity level, implementation approach, organisational culture, organisation's business process, top management commitment and other external factors (According to [8]).

According to [8] a number of studies have been conducted to find the key factors of ERP implementation success (Studies described in [21], [7], [22], [23], [24],[25], and [26]) while some other studies had also tried to evaluate it ([27], [28], [29], [30], [31], and [32]).

2.1.4 Dimensions of ERP implementation success

According to [33] (as cited in [04]) Delone and McLean has conducted an extensive literature review on 180 empirical studies published in six top Information System's journals and one of the most important Information System's conference proceedings, classifying dimensions of Information System's (IS) success into six categories and they are listed below.

i. System quality: The desired characteristics of an IS itself.

ii. Information quality: The desired characteristics of the product of an IS.

iii. Use: The receipt consumption of the product of an IS.

iv. User satisfaction: The receipt response to the use of the product of an IS.

v. Individual impact: The effect of information on the behaviour of a receipt.

vi. Organisational impact: The effect of information on organisational performance.

According to [04], Grabski and Leech have developed five factor critical success factor model. These factors include project management, change management, alignment of the business with the new system, internal audit activities and consultant planning and activities. According to their research all five factors are necessary, but none are sufficient for the successful implementation.

In [34] (as cited in [04]) has showed that the success of implementing ERP system is largely determined by the quality dimensions. They showed that technological newness was the most important factor in determining the quality of the system. System quality, such as performance, flexibility of changes, response time, and ease of use, is a technical issue. Their result confirmed conventional wisdom that the pursuit of state-of-the art technology is a risky proposition.

Also according to [8], Dantes and Hasibuan have identified four indicators in measuring the ERP implementation success, namely: budget, time, performance and benefit.

2.1.5 SAP ERP

SAP R/3 has been the leading vendor in the ERP market (According to [15]). Its application has spread across various industries like agriculture, oil, gas, mining, education, chemicals, clothing and textiles, automotive, communication and electronics. Large companies like Microsoft, General Motors, Nestlé IBM and Lucent Technologies are operating on R/3.

However, according to [15] reported organisational experiences and market statistics relating to ERP have been contradictory.

i. FoxMeyer Drug claims that its SAP R/3 initiative led its business into bankruptcy (Davenport, 1998)

ii. Chevron Corp. experienced a drop in purchase cost by 15% with hopes for a further 10% (Anonymous, 1998)

iii. The total ERP market was estimated to reach $35 billion in 1997 (Mullin, 1997) and is expected to reach $94 billion by 2002 (Stein, 1997)

iv. Some recent figures show that more than 70% of ERP implementations do not achieve their estimated benefits (Anonymous, 1998)

v. A recent survey reveals that popular ERP packages fall short of expectations in their levels of increasing turnover, recruitment and training (Deloitte, 1998)

2.2 Organisational structures

According to [35] organisations are collection of people gathered together for implementing their targets and purposes. Organisations have different types of structures, which are adapted according to the needs and the condition of that organisation (According to [36]).

According to [16] Ghorbani and his team have identified Organisational Dimensions as special characteristics that make them to understandable and comparable. Accordingly, they have classified those characteristics under two dimensions as content dimensions and structural dimensions. Content dimension indicate whole organisational characteristics and structural dimensions state internal organisational characteristic. These structural dimensions provide a basis for organisation, which make it measurable and comparable. This identification is similar to organisational structure which has been identified by many scholars in relation to organisational internal characteristics.

According to [36] they have identified functions of organisational structure and organisational variable depending on organisational structure, according to several researchers as follows.

i. Organisational structure determines the formal reporting communications and it represents the levels which exist in administrative hierarchy and also specifies the extent of the managers' and principals' control (According to [37]).

ii. Followings are also depend on organisational structure (According to [38] as cited in [36]:

a) the people's formal communications
b) organisational job status
c) the degree of accessing to information
d) job descriptions
e) resource allocation
f) rules and regulations
g) compliance and enforcing the rules
h) coordinating between the activities

2.2.1 Defining organisational structure

As in the case of the definitions of the ERP systems, there is no universally accepted definition for organisational structure as it is defined differently by different researchers.

Organisational structure is a primary driver of change since it provides the skeletal structure for all organisational decision and process (According to [17]). The organisational structure has been known as the logical and reasonable distributor of the occupation responsibilities, power and way of arranging as well as connecting communications to reach to the main organisational targets (According to [35]). Accordingly, it is one of the firs pioneer organisations that every organisation requires in relation to construct its foundation in this regard.

According to [39] it describes the organisational structure as the representation of the totality of links and relationships between and within its factors at all levels of the organisation in precisely defined quantities.

2.2.2 Classification of organisational structure

Burns and Stalker believe that the most effective structure is the one conformed to settings requirements (According to [36]). Most common classification of organisational structure is dividing it in to mechanical and organic structure.

Mechanical structure is identified through the attributes such as complexity and high formality, centralization, programmed behaviours and in the format of regulations. In this structure the manager is dependent on the organisations' policy and functions as a response to unpredictable events (According to [38] as cited in [36]).

On the other hand the organic structure is flexible and the degree of person's influence is dependent on his skills and knowledge. The duties in this structure are flexible too; and interaction with is environment. The attributes of decentralized authorities, fewer rules and regulations, informal communication network and attending self-controlling paves the way to higher conformity of organic structure with environment (According to [36]).

2.2.3 Elements of organisational structure

Common agreement cannot be seen among the researchers regarding the dimensions of organisational structure. Researchers have identified varying number of dimensions.

Five elements of organisational structure have been identified according to [39] as:

i. Organisation of production means and rational design of environment
ii. Organisation of the working community (personnel)
iii. Division of the task to every detail
iv. Organisation of interior relations
v. Determination of time sequence of tasks

The seven Structural Dimensions Characteristics according to [40] are:

i. Formality: It tries to set a standard for duties. When the level of formality increases, then description of specified rules and regulations would be great and clear instructions for job process is available.

ii. Concentration: It relates to levels of hierarchy authorities that could make decisions. If the head make most of decisions in organisation, organisation will be centralized. In decentralized organisations more power is vested in to inferiors and such decisions are made in lower layers.

iii. Complexity: The amount of separation which exists in an organisation and it is categorized in to 3 categories: Horizontal separation, Vertical separation, Geographical separation.

iv. Tendency to expertise (specialization): It divides works and affairs to expert duties.

v. Hierarchy: It defines that everyone should report their work to their superior who will be defined by vertical lines in organisation chart.

vi. Setting standard: It defines similar duties in organisation with similar and alike style personnel. To compare organisations in this case, the average of personnel education years will be measured.

vii. Personnel ratios: It states the ratio of people who employ in different divisions. According to these characteristics, the limitation of every organisation structure would be between two kind of mechanic samples and organic samples. In mechanic sample which is administered by one chief (bureaucracy); works are formal and information network is limited and works are divided into divisions, in such an organisation, inferior employers

cannot participate in decision-making process. In other way, there is another formation which is called organic and the structure of this formation is widely and horizontally spread and including teams whose members are experts and belong to different levels of organisation.

Study in [35] has used three dimensions of organisational structure as formality, complexity and concentration. Bertz and Stucker also have identified similar types of dimensions of organisational structure including three constituents of complexity, formality and centralization (According to [41] as cited in [36]).

In this study six dimensions as prescribed by [42] is used as:

i. Work specialization: The degree to which tasks in an organisation are subdivided into separate jobs.
ii. Departmentalization: The basis by which jobs in an organisation are grouped together.
iii. Centralization: The degree to which decision making is concentrated at a single point in an organisation.
iv. Formalization: The degree to which jobs within an organisation are standardized.
v. Chain of command: The unbroken line of authority that extends from the top of the organisation to the lowest echelon and clarifies who reports to whom.
vi. Span of control: The number of subordinates a manager can efficiently and effectively direct.

CHAPTER 03 – METHODOLOGY

3.1 Introduction

The aim of this chapter is to provide an understanding of the research methodology used in the study to accomplish the research objectives in order to address the research problem. This includes the method of the study to achieve the research objectives and the operationalisation process of the study. The method of study covers the areas including research design, sources of data, method of data collection, sampling, methods of measurement and the method of the data analysis and evaluation.

This study was a correlational study, which was aiming at understanding the impact of the successful implementation of ERPs on the organisational structure. The dependent variable was the organisational structure whereas the independent variable was the implementation success of the ERP. The measurement instrument of the study was a questionnaire, which was developed after considering several other questionnaires in assessing the ERP implementation success and the organisational structure in previous studies.

3.2 Purpose of the study

According to [44], often used classification of research purpose in the research methods' literature is threefold, which includes purposes of exploratory, descriptive and explanatory.

An exploratory study is undertaken when not much is known about the situation at hand, or no information is available on how similar problems or research issues have been solved in the past (According to [43]). However, organisational structure was a phenomenon, which has been studied in the past. In this study, it aims at understanding the impact of ERP implementation success on the organisational

structure. According to [43] it has been stated that, studies in this nature are descriptive studies, which is undertaken in order to ascertain and to describe the characteristics of the variables of interest in a given situation.

3.3 Research design

Issues related to decisions regarding the purpose for the study, its location, the type of investigation, the extent of researcher interference, the temporal aspect and the unit of analysis were integral to research design (According to [43]). Therefore the following section presents the conceptual structure of the research design, according to which this research was conducted.

3.3.1 Type of investigation

The type of the investigation can either be causal or correlational. The study in which the researcher wants to delineate the cause of one or more problems is called a causal study. When the researcher is interested in delineating the important variable associated with the problem, the study is called a correlational study (According to [43]).

The present study was aiming at understanding the impact of independent variable which is the ERP implementation success on the organisational structure. Therefore, the study was a correlational study.

3.3.2 Extent of research interference with the study

The extent of researcher interference in the study means, the extent of interference by the researcher with the normal flow of work at the workplace. This study was a correlational study that studies the relationship between the ERP implementation successes perceived by the end users of ERP system on the organisational structure. Either of these variables was not interfered by any means of experiment through this study.

According to [43] a correlational study is conducted in the natural environment of the organisation with minimum interference by the researcher with the normal flow of work. Hence the present study is a correlational study which was carried out under minimal interventions to the normal day today flow of work.

3.3.3 Study setting

The present study was a field study since it was a study which was done in several organisations where ERP systems are already implemented.

3.3.4 Time horizon

A study can be done with data gathered just once or at more than one point in time. If data are gathered just once then those studies are cross sectional studies and if data are gathered more than one specific time then those studies are longitudinal studies.

This study was a cross sectional study, a study of a particular phenomena at a particular time, where data collected from selected end users of ERP systems and heads of IT departments using questionnaires.

3.3.5 Unit of analysis

The unit of analysis refers to the level of aggregation of the data collected during the subsequent data analysis stage. (According to [43])

The unit of analysis of the present study was individual since the study was aiming at individual end users' experience of the impact on the organisational structure by the implementation success of ERP systems.

3.3.6 Research approach

The extent to which the researcher is clear about the theory at the beginning of the research leads to the specific research approach the researcher can follow (According

to [44]). If the researcher intends to develop a theory and hypothesis and design a research strategy to test the hypothesis then the researcher should use the deductive approach. Inductive approach need to be used if the researcher collects data and develops a theory as a result of the analysis of the collected data.

Organisational structure as well as implementation success/ failure of ERP system are popular study area among most of researchers in the field. However, the relationship between these two areas is an under researched area especially in the Sri Lankan context. The developed theoretical framework is not tested previously. Therefore it can be identified that, this study is following an inductive approach.

3.3.7 Research strategy

The research strategy is the general plan of how the researcher will go about answering the research question (According to [44]). A researcher can implement several research strategies such as experiments, surveys, case studies, action research, grounded theory, ethnography and archival research. In the present study survey strategy is used with administrating questionnaires.

3.4 Sources of data

Data can be obtained from primary and secondary sources. If the researchers initially obtain the data relating to the variables under study by themselves, then those data are identified as primary data. Secondary data are the data which is gathered from the sources which already exist.

In this study both of these data sources were used.

3.4.1 Primary data sources

Sources of primary data used in the study were mainly the individuals at the selected manufacturing organisations.

The data gathered from those sources were mainly used to test the hypothesis developed, undertake several tests to achieve research objectives and to get an insight into how the changes have happened in the organisational structure of the selected organisations with the implementation of ERP systems.

3.4.2 Secondary data sources

Several secondary data sources were used in the study to collect data in relation to the literature review of the study, back ground of the study, research methodology and data analysis. Those sources were as follows;

i. Organisational records: e.g. Project Reports and proposals such as proposals for implementation of SAP ERP from SAP implementation partners.

ii. Journals: e.g. Emerald Insight

iii. Text Books: e.g. Organisational Behaviour, by Stephen P. Robbins and Timothy A. Judge

iv. Research Reports

v. Magazines- e.g. IEEE reference guide

vi. Websites- e.g. www.haycarb.com

3.5 Methods of data collection

Data collection methods are the ways in which data were gathered from different sources of data. According to [43] data collection methods include interviews, questionnaires, observations and a variety of other motivational techniques such as projective tests. Out of these, the questionnaire method was used in this study.

3.5.1 Questionnaires

Questionnaires were the main data collection instrument in this study. This questionnaire was administered among eighty nine (89) end users of ERP systems. The questionnaire was carrying questions to evaluate the end users experiences with the ERP system implementation in relation to changes in organisational structure and benefits and performances of the ERP system. The sample questionnaire and the classification of the questions according to the elements of the independent and dependent variable are mentioned in the Appendix A and Appendix B respecivly.

3.6 Reliability of the questionnaire

The reliability refers to the extent to which an instrument consistently measures what it was intended to measure (According to [45]).

In this study Cronbach's Alpha test was carried out in order to test the reliability of the questionnaire.

3.7 Sampling

Sampling refers to the process of selecting participants for a study (According to [46] as cited in [45]). The population was the entire group of people, events or things of interest that the researcher wishes to investigate. A sample is a subset of the population. It comprise of some members selected from the total population.

The sampling procedure used by the researcher in the present study was non probability convenience sampling. In the present study the selected organisations were having around 1200 of end users and 89 end users were selected out of them with the researcher's personal contacts.

This could be categorized under the convenience and as a non-random sampling where the researcher select the individuals who were available and accessible at the time (According to [45]).

3.8 Conceptualization and operationalization process

In the conceptualization, formulating the conceptual model or theoretical framework used in the study was introduced. In operationalisation, concepts were operationally defined so that they could be measured.

3.8.1 Theoretical framework

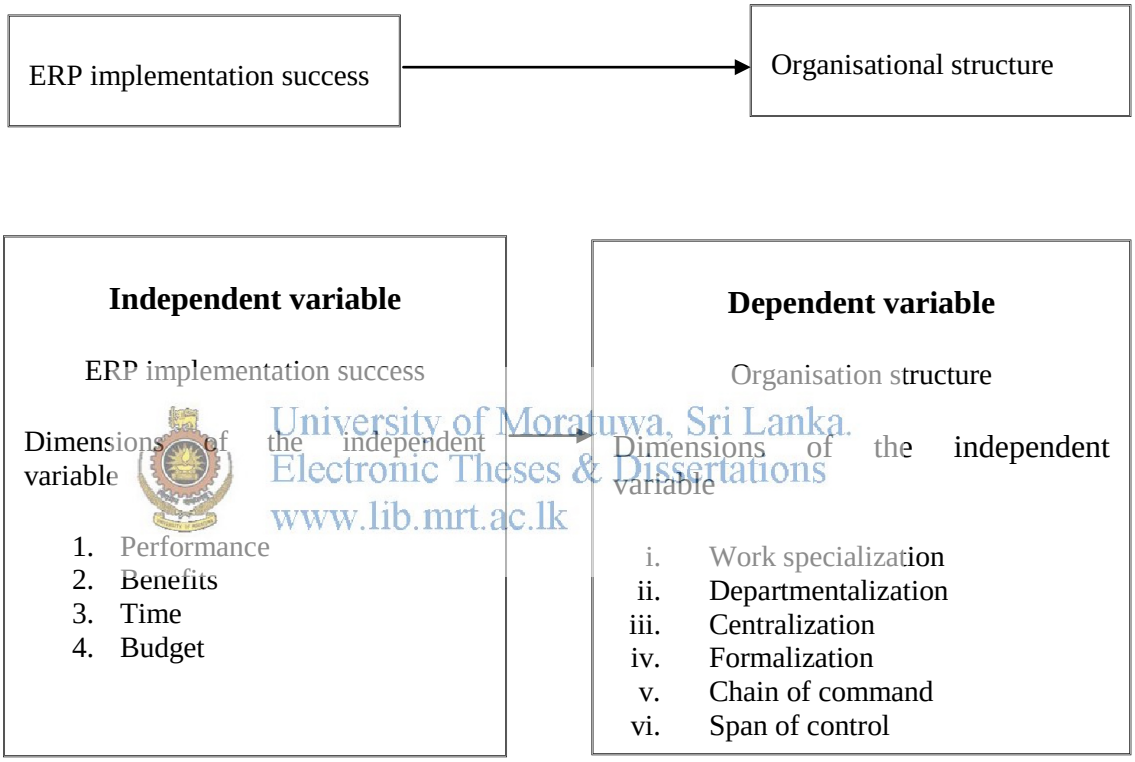


Figure 3. 1 The theoretical framework of the study

The theoretical framework in the above Figure 3.1 shows the independent variables which will result in changes in organisational structural elements which are the elements of the dependent variable.

This framework consists of six (06) dimensions of the organisational structure. They have been defined from the definitions according to [42] and those are the dependent variables of the study. They are as follows.

i. Work specialization: The degree to which tasks in an organisation are subdivided into separate jobs.

ii. Departmentalization: The basis by which jobs in an organisation are grouped together.

iii. Centralization: The degree to which decision making is concentrated at a single point in an organisation.

iv. Formalization: The degree to which jobs within an organisation are standardised.

v. Chain of command: The unbroken line of authority that extends from the top of the organisation to the lowest echelon and clarifies who reports to whom.

vi. Span of control: The number of subordinates a manager can efficiently and effectively direct.

Even though there are four dimensions in the independent variable, both time and budget were considered as constant in this study as per the information gathered through senior management of all the organisations, the respond was their respective ERP implementation project could be considered as on time and on budget.

Therefore both time and budget were kept constant and data gathered only relevant to the other two elements which are benefits and performance. Therefore the elements of the independent variable were changed in the theoretical frame work.

The two dimensions of independent variable are:

i. Benefits: Both tangible and intangible benefits which the organisations receive after implementing the ERP system.

ii. Performances: Performances which the organisations receive after implementing the ERP system

As discussed in Chapter 2, the above dimensions have been identified by many researchers of organisational structure and the important elements of ERP implementation success.

3.8.2 The formulation of hypothesis

Based on the theoretical framework of the study following hypothesis were developed and tested in this research study in order to validate the results which were found with the used statistical analysis.

H_0: Implementation success of ERP systems are not having a direct and a positive effect / impact on the changes in organisational structure.

H_1: Implementation success of ERP systems is having direct and positive effect / impact on the changes in organisational structure.

3.8.3 Operationalization of variables

Under operationalization, an accurate working agreement of the variables used in the study is defined.

Operationalization of the independent variable

The independent variable of the study is the Implementation success of the ERP system and it is defined in the study as the ERP implementation is successful if the organisation gains the benefits and supports for its strategies. Two dimensions of the independent variable are benefits and performances. Those two dimensions are defined in a way that, higher the process change is conducted along its implementation then it will lead to higher benefits and performances. That will create competitive advantage, product differentiation, product leading and other strategic things that affect the external affairs of the organisation instead of the internal affairs.

Operationalization of dependent variable

The dependent variable of the study is organisational structure and it is defined as: how job tasks are formally divided, grouped, and coordinated. Managers need to address six key elements when they design their organisation's structure: work specialization, departmentalization, chain of command, span of control, centralization and decentralization, and formalization (According to [42]).

According to [42] the six (06) dimensions of the dependent variable are identified by using a set of key questions which is mentioned in Table 3.1.

Table 3. 1 Definition of organisational structure according to [42]

The key questions to develop the definition	The answer is provided by
To what degree are activities subdivided into separate jobs?	Work specialization
On what basis will jobs be grouped together?	Departmentalization
To whom do individuals and groups report?	Chain of command
How many individuals can a manager efficiently and effectively direct?	Span of control
Where does decision-making authority lie?	Centralization and decentralization
To what degree will there be rules and regulations to direct employees and managers?	Formalization

3.9 Methods of measurement

According to [43], there are two main categories of attitudinal scales as rating scale and the ranking scale used to measure the operationally defined dimensions and elements of a variable. In this study, a Likret scale, which can be categorized as rating scales, was used as mentioned in Table 3.2, Table 3.3 and Table 3.4.

Table 3. 2 Mean value interpretation of the level of success of ERP implementation

Range of Mean Value	Interpretation of the Mean Value
1.00 – 2.29	Low level of the implementation success of ERP
2.30 - 3.49	Moderate level of the implementation success of ERP
3.50- 5.00	High level of the implementation success of ERP

Table 3. 3 Mean value interpretation of the benefits of successful ERP implementation

Range of Mean Value	Interpretation of the Mean Value
1.00-2.29	Low perceived level of benefits after the implementation of the ERP system
2.30 -3.49	Moderate perceived level of benefits after the implementation of the ERP system.
3.50 – 5.00	High perceived level benefits after the implementation of the ERP system.

Table 3. 4 Mean value interpretation of the performance of implementation success

Range of Mean Value	Interpretation of the Mean Value
1.00-2.39	Low perceived level performance of the ERP system.
2.30-3.49	Moderate perceived level of performance of the ERP system.
3.50-5.00	High perceived level of performance of the ERP system.

3.10 Methods of data analysis and evaluation

Data analysis and evaluation is done in order to achieve objectives of the research and to answer the research question. According to [43], there are three basic objectives in the analysis as getting a feel for the data, testing the goodness of data, and testing the hypothesis developed for the research. Accordingly in the present

study several analyses were done in order to achieve the objectives of the research through achieving the objectives of data analysis. SPSS version 16.0 for windows was used to analyse and interpret the data.

3.10.1 Descriptive statistics

Descriptive statistical analysis of the variables was used as an univariate technique of data analysis. Accordingly, frequency distributions and histograms were obtained for the demographic variables. Mean, Standard Deviation, Minimum and Maximum values, Variance and Inter Correlation Matrix of the variables were obtained for both independent and dependent variables.

Goodness of data reliability and validity of the measures were tested too. Reliability of a measure was established by testing for both consistency and stability. Cronbach's Alpha was obtained to test the internal consistency and reliability. Factorial validity was established by submitting data for factor analysis. Accordingly the results of the factor analysis confirmed whether the theorized dimensions are emerged or not.

Hypothesis testing was carried out to test the hypothesis developed for the study and to validate the results obtained using descriptive statistical analysis.

CHAPTER 04 - DATA ANALYSIS AND PRESENTATION

4.1 Introduction

This chapter presents the analysis of the data collected, using SPSS 16.0 version. As described in the Chapter 3, Methodology, according to [43], three stated objectives of data analysis were identified and the data analysis was done according to that procedure of data analysis.

Several other important analysis including Univariate analysis, Bivariate analysis and Multivariate analysis for the collected data were also performed. Under this approach, checking the central tendency and dispersion in way of the mean and the standard deviation and obtaining the frequency distribution of the nominal variables, depiction using bar charts, histograms and correlation analysis were also done.

Finally, the defined hypotheses were tested to validate the results obtained using descriptive statistical analysis.

4.2 Reliability of the instrument

According to [43] the reliability of a measure indicates to what extent which is not bias and hence ensures the consistent measurement across time and across the various items in the instruments.

In this study, Cronbach's Alpha was used as a measure of consistency reliability in order to indicate how well the items in the data set are positively correlated to one another. According to [43] Cronbach's Alpha is computed in terms of the average inter correlations among the items measuring the concept. Closer the Cronbach's Alpha to 1 higher the consistency reliability.

According to [43] in general, reliabilities less than 0.60 are considered to be poor, those in the 0.70 range, acceptable, and those over 0.80 good. The results of Cronbach's Alpha tests of this study as given in the Table 4.1 shows that the Alpha values of each instrument are greater than 0.6 and it implies that the internal consistency of the instruments are satisfactory.

Table 4. 1 Cronbach's Alpha reliability coefficient

Index	Instrument	Cronbach's Alpha Value (Rounded up to two decimal places)	Remarks
1	ERP Implementation Success	0.92	Good
2	Benefits	0.78	Acceptable
3	Performance	0.89	Good
4	Organisational Structural Elements	0.61	Acceptable

4.3 Descriptive statistical analysis

Descriptive statistical analysis was carried out in order to accomplish several objectives of the study. It involves transformation of raw data into a form that would provide information to describe a set of factors in a situation (According to [43]). Under this descriptive statistical analysis, the descriptive statistics of all the independent variables and dependent variables are manipulated. Under the descriptive statistics presented, frequency distribution, measure of central tendencies and dispersion are discussed in relation to each variable. After that the Bivariate analysis and the Multivariate analysis were carried out in order to analyse the relationships between those variables.

4.3.1 Descriptive statistical analysis of independent variables of the study

The independent variable of this study is "The successfulness of the implementation of the ERP systems". The dimensions of the independent variable are "Performance of the operation with the implemented ERP-Performance" and the "Benefits that users are getting with the implemented ERP-Benefits". Frequency distributions of the independent variable were derived by means of the mean value, standard deviation, maximum and minimum values. Graphical representations of mean values for the responses received were done by using Histograms. Skewness and Kurtosis of the distributions were also presented in order to provide a better understanding of the distributions of the sample data.

Frequency distribution of the "ERP Performance" and "ERP Benefits"

Frequency distribution of the dimensions of the independent variable which are ERP Performance and ERP Benefits are described below separately.

ERP Performance

As shown in Table 4.2, the mean value of Performance of the data set is 3.65 and the median value, which is the central value of the data set, is 3.67. The standard deviation of these values is 0.49 and the difference between the mean value and the median is 0.02. As the mean value and the median value of the data set are similar to one another, it implies that the data set is approximately symmetric. The skewness value of the data set is negative, -0.76, and it is left skewed as the value of mean is less than the value of the median.

The mean value of the distribution is greater than 3.5 and it can be considered as having a high level of Performance according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 2.22 (Minimum) and 4.56 (Maximum) and these values are not falling under very low and very high level of Performance and this points out that almost all the companies are at a narrow

range of Performance. Very less is having high level of performance and also very less is having low level of Performance.

ERP Benefits

As shown in Table 4.2, the mean value of Benefits of the data set is 3.56 and the median value, which is the central value of the data set, is 3.65. The standard deviation of these values is 0.48 and the difference between the mean value and the median is 0.09. As the mean value and the median value of the data set are similar to one another, it implies that the data set is approximately symmetric. The skewness value of the data set is negative, -1.41, and it is left skewed as the value of mean is less than the value of the median.

Table 4. 2 Statistics of performance and benefits

		Performance	**Benefits**
N	Valid	89	89
	Missing	0	0
Mean		3.65	3.56
Median		3.67	3.65
Mode		3.56	4.00
Std. Deviation		0.49	0.48
Variance		0.24	0.23
Skewness		-0.76	-1.41
Std. Error of Skewness		0.26	0.26
Kurtosis		.85	2.82
Std. Error of Kurtosis		0.51	0.51
Minimum		2.22	1.71
Maximum		4.56	4.29

The mean value of the distribution is slightly greater than 3.5 and it can be considered as having a high level of Benefits according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 1.71(Minimum) and 4.29 (Maximum) and these values are falling under very low

and very high levels of benefits and this points out that while some organisations are having more benefits after implementing the ERP, some organisations are having less benefits after getting the ERP system implemented in their organisations.

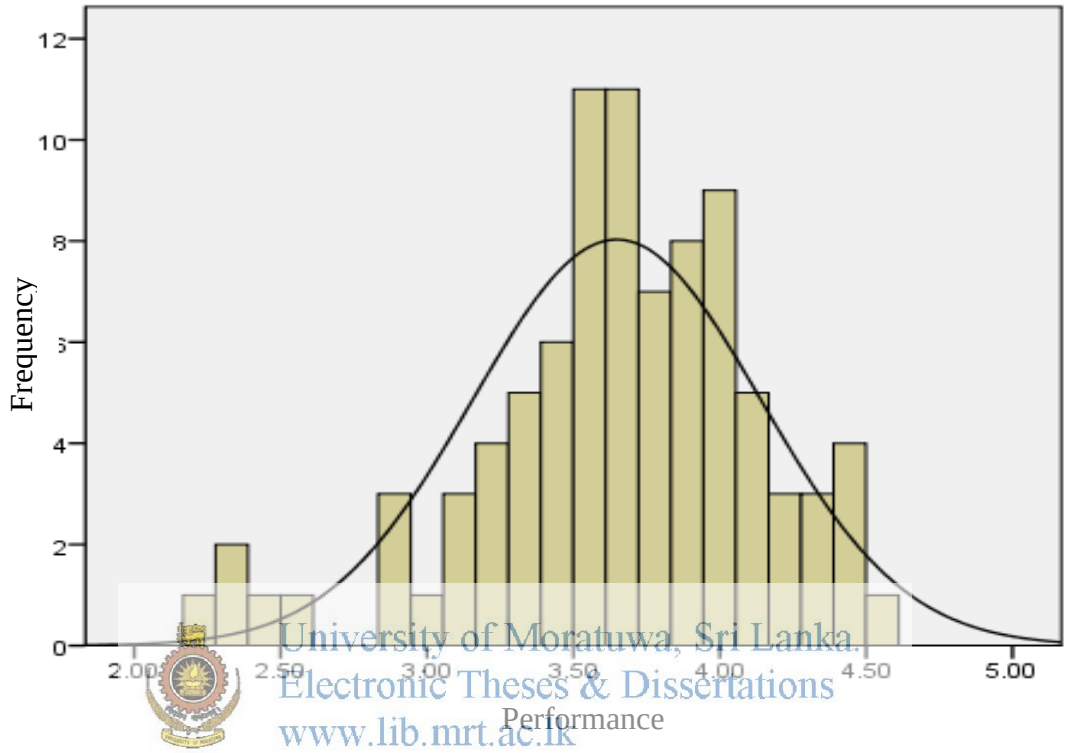
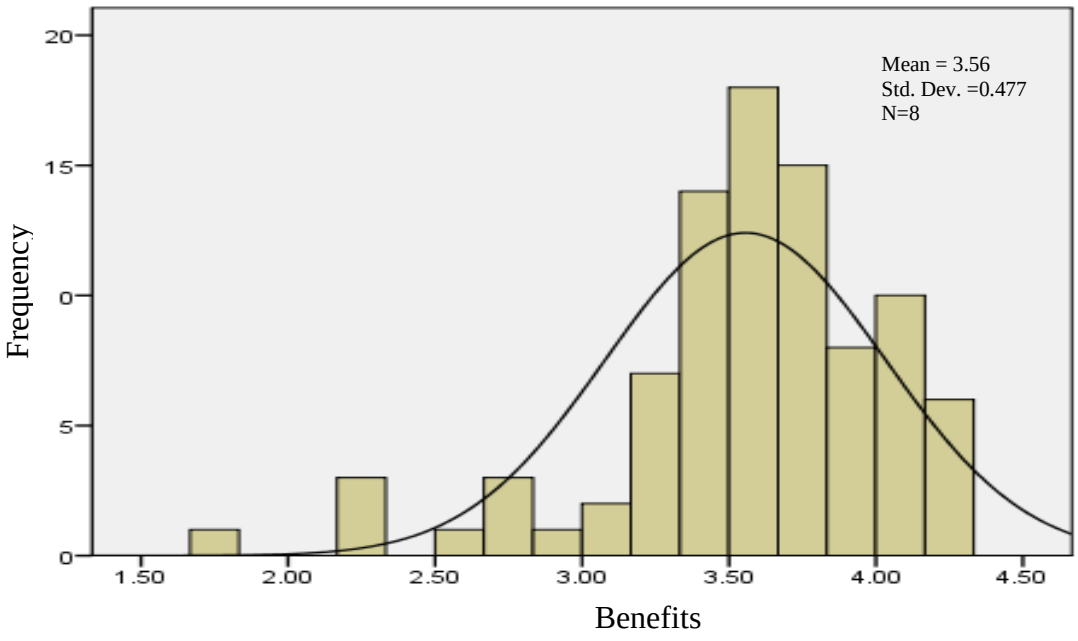


Figure 4. **1** Histogram of performance



Frequency distribution of the "ERP Implementation Success"

As shown in Table 4.3, the mean value of the ERP Implementation Success of the data set is 3.60 and the median value, which is the central value of the data set, is 3.63. The standard deviation of these values is 0.46 and the difference between the mean value and the median is 0.03. As the mean value and the median value of the data set are similar to one another, it implies that the data set is approximately symmetric. The skewness value of the data set is negative, -1.26, and it is left skewed as the value of mean is less than the value of the median.

The mean value of the distribution is greater than 3.5 and it can be considered as having a high level of ERP Implementation Success according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 1.96 (Minimum) and 4.37 (Maximum) and these values are falling under very low and very high levels of ERP Implementation success and this points out that while some organisations are achieving more ERP implementation successfulness, some organisations are achieving less ERP implementation successfulness.

Table 4. 3 Statistics of ERP implementation success

		Implementation Success
N	Valid	89
	Missing	0
Mean		3.60
Median		3.63
Mode		3.54
Std. Deviation		0.46
Variance		0.21
Skewness		-1.26
Std. Error of Skewness		0.26
Kurtosis		2.28
Std. Error of Kurtosis		0.51
Minimum		1.96
Maximum		4.37

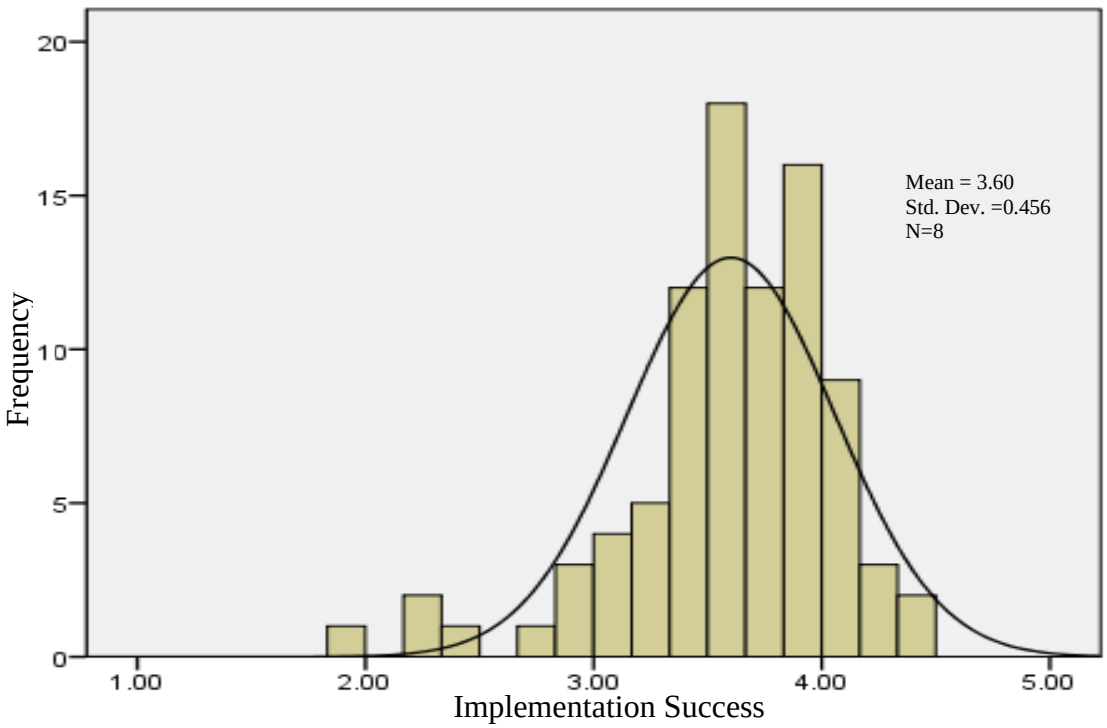


Figure 4. 3 Histogram of ERP implementation success

4.3.2 Descriptive statistical analysis of dependent variable

The dependent variable of this study is the organisational structural change. According to the conceptual framework of the study, six (06) dimensions of the organisational structure are considered. Descriptive statistics of those six dimensions and overall statistics of organisational structural change are described below.

Frequency distributions of the dimensions of the organisational structure

Frequency distribution of the six dimensions of the dependent variable is described below separately.

Frequency distribution of "Formalization"

As shown in Table 4.4, the mean value of the "Formalization" of the data set is 3.51 and the median value, which is the central value of the data set, is 3.40. The standard deviation of these values is 0.63 and the difference between the mean value and the median is 0.11. As the mean value and the median value of the data set are having a difference (as they are not approximately equal and are having a difference which is

greater than 0.1), it implies that the data set is not symmetric. The skewness value of the data set is positive, 0.30, and it is right skewed as the value of mean is greater than the value of the median.

The mean value of the distribution is almost 3.5 and it can be considered as having a moderate level of impact on the formalization (First element of the organisational structure) according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 1.80 (Minimum) and 5.00 (Maximum) and these values are falling under very low and very high levels and this points out that some organisations are having a high impact on formalization, while some organisations are having a less impact on formalization.

Frequency distribution of "Centralization"

As shown in Table 4.4, the mean value of the "Centralization" of the data set is 2.79 and the median value, which is the central value of the data set, is 2.67. The standard deviation of these values is 0.63 and the difference between the mean value and the median is 0.12. As the mean value and the median value of the data set are having a difference (as they are not approximately equal and are having a difference which is greater than 0.1), it implies that the data set is not symmetric. The skewness value of the data set is positive, 0.08, and it is right skewed as the value of mean is greater than the value of the median.

The mean value of the distribution is less than 3.5 and it can be considered as having a low level of impact on the centralization (Second element of the organisational structure) according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 1.33 (Minimum) and 4.33 (Maximum) and these values are falling under very low and very high levels and this points out that some organisations are having a high impact on centralization, while some organisations are having a less impact on centralization.

Frequency distribution of "Specialization"

As shown in Table 4.4, the mean value of "Specialization" of the data set is 3.58 and the median value, which is the central value of the data set, is 3.50. The standard deviation of these values is 0.76 and the difference between the mean value and the median is 0.08. As the mean value and the median value of the data set are similar to one another, it implies that the data set is approximately symmetric. The skewness value of the data set is negative, -0.05, and it is left skewed as the value of mean is less than the value of the median.

The mean value of the distribution is greater than 3.5 and it can be considered as having a high level of impact on specialization (Third element of the organisational structure) on the organisational structure according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 1.5 (Minimum) and 5.00 (Maximum) and these values are falling under very low and very high levels of impact and this points out that some organisation s are having a high impact on specialization while some organisations are having low impact on specialization with the ERP implementation success.

Frequency distribution of "Chain of command"

As shown in Table 4.4, the mean value of the "Chain of command" of the data set is 2.61 and the median value, which is the central value of the data set, is 2.50. The standard deviation of these values is 1.05 and the difference between the mean value and the median is 0.11. As the mean value and the median value of the data set are having a difference (as they are not even approximately equal and are having a difference which is greater than 0.1), it implies that the data set is not symmetric. The skewness value of the data set is positive, 0.65, and it is right skewed as the value of mean is greater than the value of the median.

The mean value of the distribution is less than 3.5 and it can be considered as having a low level of impact on the chain of command (Fourth element of the organisational structure) of the organisational structure according to the mean value interpretation

given in the Chapter 03. The most extreme values of the data set are 1.00 (Minimum) and 5.00 (Maximum) and these values are falling under very low and very high ends and this points out that some organisations are having a high impact on chain of command, while some organisations are having a less impact on chain of command.

Frequency distribution of "Departmentalization"

As shown in Table 4.4, the mean value of the "Departmentalization" of the data set is 3.27 and the median value, which is the central value of the data set, is 3.00. The standard deviation of these values is 0.91 and the difference between the mean value and the median is 0.27. As the mean value and the median value of the data set are having a difference (as they are not even approximately equal and are having a difference which is greater than 0.2), it implies that the data set is not symmetric. The skewness value of the data set is positive, -0.46, and it is left skewed as the value of mean is greater than the value of the median.

The mean value of the distribution is less than 3.5 and it can be considered as having a low level of impact on the departmentalization (Fifth element of the organisational structure) of the organisational structure according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 1.00 (Minimum) and 5.00 (Maximum) and these values are falling under very low and very high ends and this points out that some organisations are having a high impact on departmentalization, while some organisations are having a less impact on departmentalization.

Frequency distribution of "Span of control"

As shown in Table 4.4, the mean value of the "Span of control" of the data set is 2.87 and the median value, which is the central value of the data set, is 3.00. The standard deviation of these values is 1.01 and the difference between the mean value and the median is 0.13. As the mean value and the median value of the data set are having a difference (as they are not even approximately equal and are having a difference which is greater than 0.1), it implies that the data set is not

Table 4. 4 Frequency distribution of the dimensions of organisational structure

	Formalization	Centralization	Specialization	Chain of Command	Departmentalization	Span of Control
N						
Valid	89	89	89	89	89	89
Missing	0	0	0	0	0	0
Mean	3.51	2.79	3.58	2.61	3.27	2.87
Median	3.4	2.67	3.5	2.5	3	3
Mode	3	3.33	4	3	3	3
Std. Deviation	0.63	0.63	0.76	1.05	0.91	1.01
Variance	0.4	0.39	0.58	1.1	0.83	1.03
Skewness	0.29	0.08	-0.05	0.65	-0.46	-0.13
Std. Error of Skewness	0.26	0.26	0.26	0.26	0.26	0.26
Kurtosis	0.03	-0.86	-0.2	-0.19	0.84	0.54
Std. Error of Kurtosis	0.51	0.51	0.51	0.51	0.51	0.51
Minimum	1.8	1.33	1.5	1	1	1
Maximum	5	4.33	5	5	5	5

symmetric. The skewness value of the data set is negative, -0.13, and it is left skewed as the value of mean is less than the value of the median.

The mean value of the distribution is less than 3.5 and it can be considered as having a low level of impact on the span of control (Sixth element of the organisational structure) of the organisational structure according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 1.00 (Minimum) and 5.00 (Maximum) and these values are falling under very low and very high ends

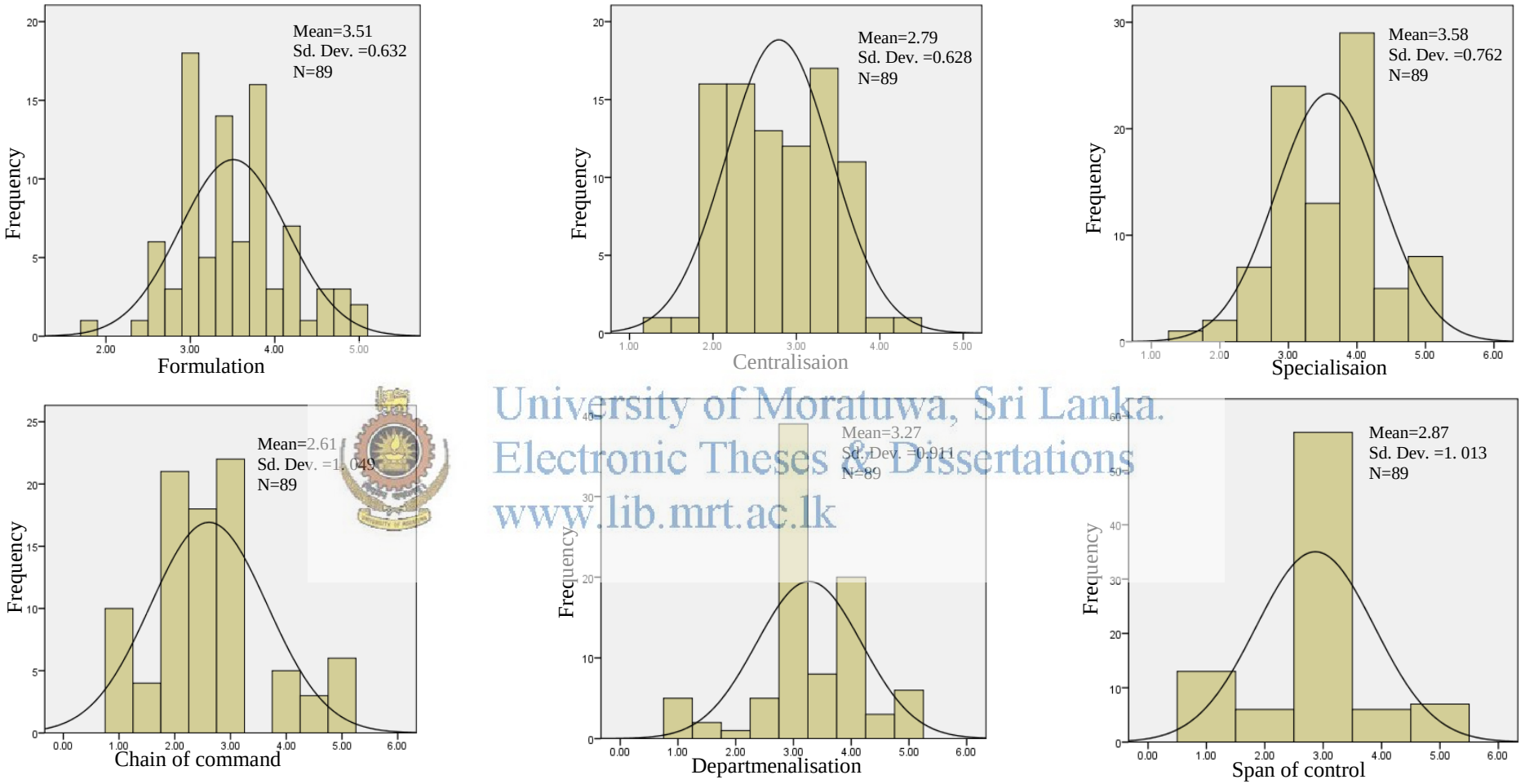


Figure 4. 4 Histograms of the elements of the organisational structure

and this points out that some organisations are having a high impact on span of control, while some organisations are having a less impact on span of control.

Frequency distribution of "Impact on organisational structural changes"

As shown in Table 4.5, the mean value of the organisational structural changes of the data set is 3.10 and the median value, which is the central value of the data set, is 3.11. The standard deviation of these values is 0.47 and the difference between the mean value and the median is 0.01. As the mean value and the median value of the data set are almost similar to one another, it implies that the data set is symmetric. The skewness value of the data set is negative, -0.35, and it is left skewed as the value of mean is less than the value of the median.

Table 4. 5 Frequency distribution of the "organisational structural changes"

		Organizational Structural Changes
N	Valid	89
	Missing	0
Mean		3.10
Median		3.11
Mode		3.18[a]
Std. Deviation		0.47
Variance		0.22
Skewness		-0.35
Std. Error of Skewness		0.26
Kurtosis		0.84
Std. Error of Kurtosis		0.51
Minimum		1.91
Maximum		4.44

The mean value of the distribution is very less than 3.5 and it can be considered as having a low level of ERP Implementation Success according to the mean value interpretation given in the Chapter 03. The most extreme values of the data set are 1.91 (Minimum) and 4.44(Maximum) and these values are not falling under very low

and very high level of organisational structural change and this points out that almost all the companies are at a narrow range of organisational structural change. Very less is having high level of organisational structural changes and also very less is having low level of structural changes.

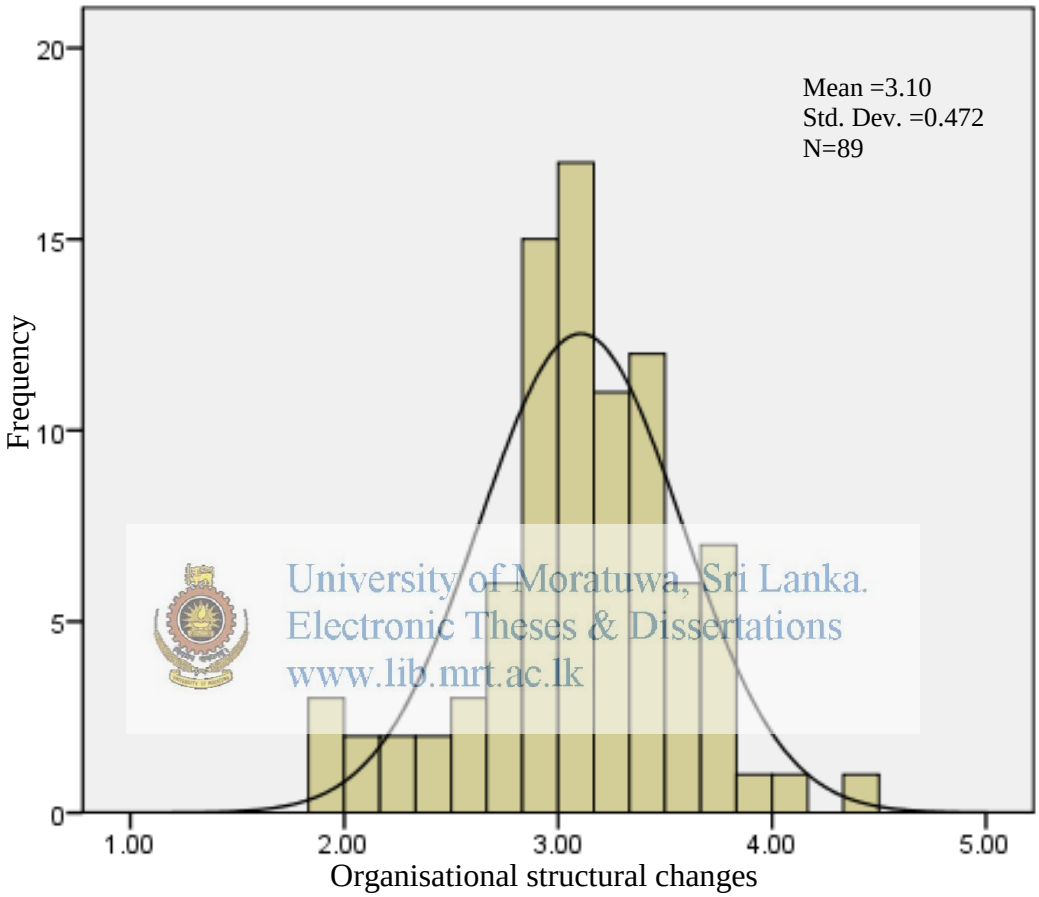


Figure 4. 5 Histogram of organisational structural changes

4.4 Bivariate analysis of independent variables and dependent variables

Bivariate Analysis was carried out in order to analyse the relationship between the variables and the dimensions of the dependent variable by considering two variable/ dimensions at a time. In this study, one independent variable and one dependent variable were studied. In order to identify the relationships between those variables, bivariate analysis was carried out and the results are given below.

Table 4. 6 Pearson correlation statistics for bivariate analysis

		Benefits	Performance	Organisational Structural Changes
Benefits	Pearson Correlation	1	0.77**	-0.14
	Sig. (2-tailed)		0	0.203
	N	89	89	89
Performance	Pearson Correlation	0.77**	1	-0.19
	Sig. (2-tailed)	0		0.08
	N	89	89	89
Organisational Structural Changes	Pearson Correlation	-0.14	-0.19	1
	Sig. (2-tailed)	0.20	0.08	
	N	89	89	89

According to Table 4.5 there is a strong positive relationship between Performance and the Benefits of the ERP systems. This is obvious and as those are the elements of the independent variable which is ERP implementation success and it has proved that when higher the success higher the benefits with higher performance. Also according to Table 4.5 this correlation is significant at the 0.01 level (2-tailed). But when the organisational structural changes (dependent variable) is concerned, there is a very weak negative correlation between benefits and performance (Correlation of -0.14 and -0.19 for both benefits and performance respectively) with Sig (2-Tailed) values which are greater than 0.01(0.20 and 0.08 for both benefits and performance respectively) and this implies that there is no significant impact on the organisational structure by both benefits and performance. This implies again that there is no significant impact on the organisational structure by the ERP implementation success.

4.5 Multivariate analysis of independent variable and dependent variable

According to the Table 4.6 all the six dimensions of the dependent variable, which is the organisational change, are having values for the Pearson Correlation coefficient

between -0.1 and -0.21 and this is a very weak negative relationship. In addition, they are having Sig (2 Tailed) values greater than 0.01.

Table 4. 7 Multivariate analysis of the independent variable and dimensions of dependent variable

Correlations

		Implementation Success	Formalization	Centralization	Specialization	Chain of Command	Departmentalization	Span of Control
Implementation Success	**Pearson Correlation**	1	-0.096	-0.004	-0.111	-0.017	-0.207	-0.127
	Sig.(2-tailed)		0.37	0.967	0.297	0.867	0.051	0.232
	N	89	89	89	89	89	89	89

**.Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

This implies that there is no significant relationship between the dimensions of the dependent variable and the independent variable and therefore there is no significant relationship between ERP implementation success and the organisational structure change.

4.6 Hypothesis testing

The Hypothesis 01(**H_0**) of this study is "Implementation success of ERP systems are not having a direct and a positive effect / impact on the changes in organisational structure. According to the tests done under the 4.4 Bivariate Analyses and under 4.5 Multivariate Analysis, the viability of Hypotheses 01 was tested. As per the test results, there is statistical evidence to state that there is;

a. A very weak negative correlation between the two dimensions of the ERP implementation success and the organisational change.

b. A very weak negative correlation between the six dimensions of the organisational structural change and the ERP implementation success.

c. A very less significant relationship between ERP implementation success and the organisational structure change.

Hence it is statistically confirmed that $\mathbf{H_1}$ which is "Implementation success of ERP systems are having a direct and a positive effect / impact on the changes in organisational structure." was not accepted. Therefore $\mathbf{H_0}$ was accepted as "Implementation success of ERP systems are not having a direct and a positive effect / impact on the changes in organisational structure."

CHAPTER 05 - RESULTS AND DISCUSSION

5.1 Findings of the study

Findings of the study through the analysis presented in Chapter 04 are discussed in relation to the research objectives, in the following section.

i. Findings related to Objective: 01

   a. To understand whether the ERP is implemented successfully in the selected manufacturing organisations meeting the expected benefits and performances from the ERP system.

Through the descriptive statistical analysis it was identified that the perceived level of benefit and performance of the implemented ERPs according to the end users are as 3.65 and 3.56. According to the mean value interpretation given in Chapter 03 it can be concluded that the ERP implementation is successful in the selected organisations as the mean values are more than 3.5.

Table 5. 1 Perceived level of benefit and performance

	Performance	**Benefits**
Mean	3.65	3.56

ii. Findings related to Objective: 02

   a. To understand the level of changes in the organisational structure of the selected organisations on the successfulness of the ERP implementation

According to the Pearson's Product Moment Analysis, none of the organisational structural elements have been impacted by the ERP implementation success.

Table 5. 2Pearson's Product Moment Analysis

Correlations								
		Implementation Success	**Formalization**	**Centralization**	**Specialization**	**Chain of Command**	**Departmentalization**	**Span of Control**
Implementation Success	Pearson Correlation	1	-0.096	-0.004	-0.112	-0.018	-0.207	-0.128
	Sig.(2-tailed)		0.370	0.968	0.297	0.867	0.051	0.232
	N	89	89	89	89	89	89	89

iii. Findings related to Objective: 03

a. To understand the highly impacted element of the organisational structure of the selected organisations with the ERP implementation success.

According to the Pearson Product Moment Analysis, it could be found that the Departmentalization is the most influential structural element compared to other structural elements as it is having the highest negative value for the Pearson Correlation, which is -0.2072. Therefore it is having the highest impact of negative correlation. However, this value is also minimal and it implies that the impact is minimal.

5.2 Discussion

In the present study it was found that the selected organisations, ERP has been implemented successfully when considered about their benefits and performances as perceived by end users of those ERP systems.

However according to previous studies ERP implementation success situations as well as failures could be identified.

According to the 2009 edition of the Standish Group report, 32% of all IT projects were completed on time, on budget and the software delivered the required level of functionality. However, as many as 44% of the projects were over budget or late, and 24% of them were terminated before completion or were not utilized after their implementation (According to [19]) resulting failures in the ERP projects. According to different studies, a lot of ERP projects do not reach the expected results or lead to the failure of the project. The study described in [20], for example, listed 117 companies which implemented ERP and had the following results: 25 percent of all the projects were out of budget, 20 percent of the projects were abruptly discontinued for various reasons, and 40 percent of the remaining 55 percent stated that they did not reach the defined goals within one year after the official project ended (According to [19]).

The study described in [47] on the effects of ERP-implementations on organisational benefits in small and medium-sized enterprises in the Netherlands is an example which is showing that intended results of ERP project have not yield as intended. Accordingly it shows comparison results of two types of organisations where ERP has implemented and not implemented. The results show that, organisational benefits did not increase more, significantly for organisations that implemented an ERP system than for organisations that did not implement such a system.

In the present study it was found that none of the organisational structural elements are having an impact from the ERP implementation success.

Several research findings are there which have taken different organisational factors as determinants of organisational structure. Accordingly some researchers have focused on organisational size as the principal determinant of structure (According to [48]), while others have noted the effect of the organisation's environment (According to [48]). And the third perspective has emphasized technology as a determinant of organisational structure (According to [48]).

The results of studies examining the relationship between technology and structure have been inconsistent as mentioned in [48].

According to [39] they have investigated the influences of information technologies on the development of organisational structure in the hotel, catering and tourist industry in Istria. Accordingly they have found that the IT, together with the other factors, has influenced the development of organisational structure at catering and touristic enterprises.

According to Whisler as cited in [48], examined the effect of the introduction of computers on the organisational structure of a sample of insurance companies, and concluded that information technology might be an important component of organisational change. That study is noting that information technology was a technology of control, concluded that information technology tended to cause the following changes in the structure of organisations: 1. Subunits (departments) are consolidated; 2. The number of levels in the hierarchy is reduced; 3. The span of control is reduced; 4. Parallel departments are replaced by functional departments; 5. Control becomes more centralized; 6. Control is shifted laterally between major executives and departments; 7. The technology becomes part of the control structure.

In the study done in [48], Information Technology and Organisational Structure have been studied by considering the organisational structure as a dependent variable. They have found that information technology is significantly correlated with several dimensions of organisational structure, controlling for the size of the organisation.

With the available literature, the impact of ERP on organisational structure could not be identified. However the available literature reveals findings of the impact of ERP on different organisational aspects. For example in a Case Study on ERP implementation in Indonesia, The Impact of Enterprise Resource Planning (ERP) System Implementation on Organisation has been studied according to [8]. They have found that from the strategically and tactical impact induced by the implementation of ERP has resulted only in tactical impact of organisations.

CHAPTER 06 - CONCLUSION AND RECOMMENDATIONS

6.1 Managerial implications

The results show that the ERP implementation success improves both the benefits and the performance with the ERP implementation success in the operations. These two elements of the independent variable are containing both tangible and intangible characteristics of the ERP. Normally the decision to implement an ERP system in an organisation is a strategic decision, which needs large investments in hardware, software, end user training, consultancy, and implementation and for other relevant costs. Normally proving out the Return on Investment (ROI) of these kinds of projects are treated as difficult because of the reason that most of the elements are intangible. If there is a positive correlation in the ERP implementation success and the benefits and the performances then it is easy to justify the viability of the project and also the positive ROI of the project.

As it was mentioned in Chapter 1, in order to accomplish the competitive advantage and higher margins, the most important factors to be reduced are the time to market and the cost of production (COP). In order to reduce these factors elimination of non-value adding activities, improvements of the efficiency and the effectiveness are very important. This can be achieved easily with higher ERP performances and benefits.

The organisations considered in this study are all in manufacturing in more than 15-20 years. Most of the organisations in this age in the Sri Lankan context have started their operations with manual systems and got them improved while being matured with time and experience. All of these organisations are not started with proper ERP systems at their early stages. They have moved for ERP systems once the processes are matured with the manual systems and when they feel that they need a proper and efficient system to make their operation efficient and effective. Most of these organisation are having their own processes discovered by themselves trial and error

with time which are very unique to those particular organisations. They may not be using the standard practices but may be their own defined ways. By the time these organisations are implementing ERP systems, because of their processes are matured, the system is implemented by customizing it to the operation rather than customizing the operation to the ERP standard practices. This may be the reason that the organisational structure is not impacted by the ERP implementation success. The organisational structure is also developed and matured with the processes in a long time and it has been optimized by the time the ERP is implemented and it is customized in a way to conform with the organisations own practices which are considered as the best practices for that particular industry.

Therefore the benefits and the performance will improve the operation of the organisations which will bring the competitive advantage for those organisations faster while the structure is being intact.

6.2 Suggestions for future work

With this study and after considering the available literature, following areas for future work is suggested for the researchers in the field with special reference to overcome the limitations of the study.

i. In this study the implementation success was measured using only two dimensions. Those are ERP performance and benefits. There may be several other dimensions need to be considered. Those dimensions can be considered in future research studies.

ii. The questionnaire method was used as the main data collection instrument in this study. Due to that some inherent limitations of the questionnaire method cannot be ignored from the study. It is recommended for future researchers to use data collection method more towards qualitative approach.

iii. In this study, a non-probability convenient sampling method was used. There are some inherent limitations of this method also when it comes to the

generalisability of the results. Due to that it is suggested to use a probability sampling method which enables the results of a study to be generalized.

iv. Even though a formal structure is defined in the process of organizing in any organisation, there would be some informal structures also in those organisations. In this study it does not consider the informal structures of organisations. Therefore the hidden part will not be reflected properly during the study which will change the shape of the real result of the study. Due to that it can be suggested to incorporate the informal structures of an organisation in studying the relationship between organisational structure and ERP implementation success. Doing the research in a qualitative manner will help in considering the informal structures of the organisations.

Further it is evident that, with the lack of availability of the literature of the ERP implementation success in the Sri Lankan context, different studies in the field are required, especially with the intention of enhancing the organisational performances and benefits with IT technological advancements.

REFERENCE LIST

[1] K. Frazee and M. R. Khan, "ERP Implementation for Corporate Growth and Sustainability," *International Journal of Business and Social Sciences*, vol. 3, no. 2, pp. 74-82, 2012.

[2] B. Bae and P. Ashcroft, "Implementation of ERP Systems: Accounting and Auditing Implications," *International Journal of Business and Social Science*, vol. 3, no. 3, pp. 1-22, 2012.

[3] E. W. T. Ngai, C. C. H. Law and F. K. T. Wat, "Examining the critical success factors in the adoption of enterprise resource planning," *Computers in Industry*, vol. 59, no. 3, pp. 548–564, 2004

[4] B. T. Patil, B. E. Narkhede, S. K.Mahajan and A. P. Joshi, "Performance Evaluation of Enterprise Resource Planning (ERP) Systems in Indian Manufacturing Industries," *International Journal of Research in Management & Technology*, vol. 2, no. 1, pp. 72-75, 2012.

[5] T. H. Davenport, "Putting the enterprise into the enterprise system," *Harvard Business Review*, vol. 76, no. 4, pp. 121-131, 1978

[6] F. F. Nah and J. L. Lau, "Critical factors for successful implementation of enterprise systems," *Business Process Management*, vol. 7 no. 3, pp. 285-296, 2001

[7] W. H. DeLone and E. R. McLean, "Information Systems Success: The Quest for The Dependable Variable," *Information Systems Research*, vol. 3, no. 2, pp. 60-95, 1992

[8] G. R. Dantes and Z. A. Hasibuan, "The Impact of Enterprise Resource Planning (ERP) System Implementation on Organisation: Case Study ERP Implementation in Indonesia," *IBIMA Business Review*, [On-line] vol. 2, no. 2, pp. 1-10, 2011.

[9] K. Matengu and B.N. Swami, "Impact of Enterprise Resource Planning (ERP) in Accounting Systems: A Case Study," *International Journal of Management & Business Studies*, [On-line] vol. 1, no. 3, pp 21-27, 2011.

[10] A. I. Nicolaou and S. Bhattacharya, “Organisational performance effects of ERP systems usage: The impact of post-implementation changes,” *International Journal of Accounting Information Systems*, [On-line] vol. 7, no. 3, pp. 18-35, 2006.

[11] A. Amid, M. Bagheri and S. Ghasrodashti, “Analysis the Impact of Enterprise Resource Planning Systems on Organisational Effectiveness,” *Iran International Journal Of Systems Applications Engineering & Development*, vol. 4, no. 3, pp.76-86, 2010.

[12] W. She and B. Thuraisingham, ”Security for Enterprise Resource Planning Systems,” *Information Systems Security*, vol. 16, no. 2, pp. 152–163, 2007.

[13] S. A. Kronbichler, H. Osermann and R. Staudinger, “A Comparison Of ERP-Success Measurement Approaches,” *Journal of Information Systems and Technology Management*, vol. 7, no.2, pp. 281-310, 2010.

[14] K. Kumar and J. Hillegersberg, “ERP Experiences and Evolution,” *Communications of the ACM*, vol. 43, no. 4, pp. 22-26, 2000.

[15] M. A. Al-Mashari, J. King Saud, “Implementing ERP through SAP R/3: A Process Change Management (PCM) Perspective,” *Comp. & Info. Sci*. [On-line] vol. 14, no. 4, pp. 25-38, 2001.

[16] A. Bhagawani, “Critical Success Factors in implementing SAP ERP software,” M.S. thesis, Faculty of the Graduate School, Kansas Univ., 2009.

[17] C. L. Wang and P. K. Ahmed, “Structure and Structural dimensions for knowledge based organizations,” *Measuring Business Excellence.*, [On-line] vol. 7, no. 1, pp. 51-62, 2003.

[18] Dezdar, S., and Ainin, S. 2012. "Examining Successful ERP Projects in Middle-East and South-East Asia," *American Journal of Scientific Research,* vol. 56, no. 3, pp. 13-56, 2012

[19] G. Hołodnik-Janczura and M. Lerka, “Evaluation Of The Influence Of Selected Factors On A Successful ERP Software Implementation,” *Operaions Research And Decisions*, vol. 3, no. 4, pp. 31-40, 2010.

[20] D. Cooke, L. Gelman and W. J. Peterson, “ERP Trends,” *The Conference Board*, pp. 1-28, 2001

[21] W. Tsai, T. S. Tsaur, Y. W. Chou, J. Y. Liu and J. L. Hsu, "Identification of Critical Failure Factors in the Implementation of Enterprise Resource Planning (ERP) System in Taiwan's Industries," *International Journal of Management and Enterprise Development*, 2005.

[22] T. M. Somers and K. G. Nelson, "A Taxonomy of Players and Activities Across the ERP Project Life Cycle," *Information and Management*. 2004.

[23] V. B. Gargeya, and C. Brady, "Success and Failure Factor of Adopting SAP in ERP System Implementation," *Business Process Management Journal*, vol. 11, no. 5, pp.501-516, 2005

[24] I. C. Ehie and M. Madsen, "Identifying Critical Issues in Enterprise Resource Planning (ERP) Implementation," *Computers in Industry*, vol. 56, no. 2, pp.545-557, 2005.

[25] T. R. Bhatti, "Critical Success Factors for The Implementation of Enterprise Resource Planning (ERP): Empirical Validation," *The Second International Conference on Innovation in Information Technology* , 2005.

[26] B. Y. Chung, "Analyzing Enterprise Resource Planning System Implementation Success Factors in the Engineering - Construction Industry," *Journal of Computing in Civil Engineering*, pp. 373 – 382, 2008

[27] J. Motwani, "Successful Implementation of ERP Systems: A Case Study of an International Automotive Manufacturer," *International Journal of Automotive Technology and Management*, vol. 5, no. 4, pp. 375-386, 2005

[28] C. Brown and I. Vessey, "Managing the Next Wave of Enterprise Systems: Leveraging Lessons from ERP," *MIS Quarterly Executive*, 1999.

[29] G. R. Dantes, "ERP Implementation and Its Impact for Human & Organizational Cost", *M.S. Thesis*, University of Indonesia, Jakarta, Indonesia. Measurement Model: a Preliminary Study", *Journal of Information Technology Management*, vol. 17, no.1, pp.14-33, 2006.

[30] F. Carton and F. Adam, "Analysing the Impact of Enterprise Resource Planning Systems Roll-outs in Multi-National Companies," *Electronic Journal of Information Systems Evaluation*, vol. 6, no. 2, pp.21-32, 2003.

[31] Barki, H., Oktamis, S. and Pinsonneault, A, "Dimensions of ERP Implementations and Their Impact on ERP Project Outcomes," *Journal of Information Technology Management*, vol. 16, no. 1, pp. 1-9, 2005.

[32] J. Gunson and J. P de Blasis, "Implementing ERP in Multinational Companies: Their Effect on the Organization and Individuals at Work," *Journal ICT*, pp. 1-20, 2002.

[33] W. H. Delone and E. R. McLean, "Information systems success: The quest for the dependent variable," *Information Systems Research* vol. 3, no. 3, pp .60–95, 1992

[34] S. Chien and S. Tsaur, "Investigating the success of ERP systems: Case studies in three Taiwanese high-tech industries," *Computers in Industry*, vol. 58, no. 4, pp. 783–793, 2007.

[35] S. Noorbakhsh and J. Ghahramani, "The relationship between organisational structure and efficiency of the approach employed in professional and technical staff in the second semester of Tabriz," *Advances in Environmental Biology*, vol. 7, no. 11, pp. 3370-3375, 2012

[36] S. Rajaeepour, A. Azizollah, Z. Mahmoud and S. Solmaz, "Relationship between Organisational Structure and Organisational Alienation," *Interdisciplinary Journal Of Contemporary Research In Business*., [On-line] vol. 3, no. 12, pp. 118-196, 2012

[37] N. Anand and R. L. Daft, "What is the Right Organisation Design?," *Organisational Dynamics*, vol. 36, no. 4, pp. 329-334

[38] A. Ergenli, "Psychological empowerment and its relationship to trust in immediate managers," in *Journal of Business Research*, vol. 60, no. 5, pp. 41-49, 2007.

[39] J. Sehanovi´c and M. Zugaj, "Information technologies and organisational structure," *Library Management*, [On-line] vol. 18, no. 2, pp. 80–87, 2014.

[40] M. Ghorbani, J. T. Noghabi and M. Nikoukar, "Relationship Between Organisational Structure Dimensions and Knowledge Management (KM) in Educational Organization," *World Applied Sciences Journal*, vol. 12, no. 11, pp. 2032-2040, 2011

[41] J. Greenberg and R. A. Baron, "Organizational structure and design, in Behavior in Organizations," 5th Edition. Englewood Cliffs, NJ, Prentice-Hall, pp. 576-601, 1995

[42] S. P. Robbins and T. A. Judge, "Organisational Behavior," *United States of America, Pearson Education*, pp.480-490, 2013

[43] U. Sekaran, "The Research Process," *In Research Methods for Business- A Skill Building Approach*, 4th edn Wiley Student Edition, India, 2010.

[44] M.N.K. Saundars, M. Saundars and P Lewis, "Research Methods for Business Students", 5th edn, Pearson, India.

[45] Y. N. Bui, "How To Write A Master's Thesis", Sage Publication, California, 2014.

[46] L. R. Gay, G, E. Mills and P. W. Airasian, "Educational Research: Competencies for analysis and applications (10th ed.). Upper Saddle River"

[47] I. De Loo , J. Bots, E. Louwrink, D. Meeuwsen, P. V. Moorsel and C. Rozel "The effects of ERP-implementations on organisational benefits in small and medium-sized enterprises in the Netherlands," 8th International Conference on Enterprise Systems, Accounting and Logistics (8th ICESAL 2011) [On-line], pp.59-78, 2011

[48] J. Pfeffer and H. Leblebici, "Information Technology and Organisational Structure" The Pacific Sociological Review. [On-line] vol. 20, no. 2, pp. 241-261, 2014.

APPENDIX A

K. D. Asanga Jayanada is a MEng student from Department of Mechanical Engineering, University of Moratuwa. As the final requirement of his MEng degree, he is now engaged in a research on "Impact of the successful implementations of Enterprise Resource Planning (ERP) systems on organizational structure in Sri Lankan manufacturing sector". The researcher would like to extend his sincere gratitude to all the respondents for allocating their valuable time with busy schedules to complete this questionnaire. The information furnished by you will be dealt with strict confidentiality and be used only for academic purposes. Under no circumstances will your identity be divulged. You may contact the researcher via asangajk@gmail.com or 0714800889.

The Questionnaire

	How do you evaluate the level of performance of the ERP in relation to following areas?	Very Low	Low	Moderate	High	Very High
1	Saving end user time	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
2	Simplification of day to day tasks (user task)	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
3	Reduction of Paper work	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
4	Improvement of single point data entry and eliminated non value adding tasks in the operation	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
5	Easiness to obtain the information, which could be obtained earlier, only from other departments, now available over the system	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
6	The level that you are feeling of ownership improved among the functional heads and end users	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
7	Improvements in the interdepartmental relationship	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
8	Improvements in the individual productivity	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
9	Improvements the group/departmental productivity	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]

	Does your organization experience following benefits with the implementation of the new ERP?	Very Low Fully Disagree	Low Disagree	Moderate Neither	High Agree	Very High Fully Agree
1	Reduction in planning cycle time	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
2	Reduction manufacturing cycle time	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
3	Improvements of customer service	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
4	Decreased lead times	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
5	Reduced cost of serving customers	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
6	Reduction of inventory	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
7	Reduction in errors in ordering material(Procurement)	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
8	Increase throughput time of the operation	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
9	Increase in sales volume of the organization	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
10	Facilitate to improve the competitive position of the organization in the industry	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
11	Supports in improving communication over the supply chain	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
12	Improves the better coordination in between functional managers	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
13	Improved forecasting	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
14	Reduction in information delay	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
15	Improvements in decision making	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
16	Streamline the business processes	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
17	Increase in overall satisfaction with business Processes	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]

	With the implementation of the new ERP have you experienced the following	Yes	No
1	Standard Operating Procedures(SOP)	1. [ ]	2. [ ]
2	Standing instructions	1. [ ]	2. [ ]
3	Activities of your job description	1. [ ]	2. [ ]
4	Rules and regulations	1. [ ]	2. [ ]
5	Policies	1. [ ]	2. [ ]

	Do you agree with the following results occurred with the implementation of new ERP	Very Low Fully Disagree	Low Disagree	Moderate Neither	High Agree	Very High Fully Agree
1	Your superior makes most of the decisions relating to your job role than before	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
2	You have less authority than before in carrying out activities relating your job	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
3	Your responsibility relating to your job is decreased	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
4	Always there will be a stop in the operation if you do not do the transactions online in the system	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
5	In order to do the transactions online in the system always some others should complete their online transactions before hand	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]

	With the implementation of the new ERP have you experienced the following	Decreased	No Impact	Increased
1	Number of subordinates	1. [ ]	2. [ ]	3. [ ]
2	Creation of new positions in the organization	1. [ ]	2. [ ]	3. [ ]
3	Creation of new departments in the organization	1. [ ]	2. [ ]	3. [ ]
4	Transfers to new departments	1. [ ]	2. [ ]	3. [ ]

	Was any change happened to the following elements to your job role with the implementation of new ERP system in your organization?	Decreased	No Impact	Increased
1	Change of immediate superior	1. [ ]	2. [ ]	3. [ ]
2	Standing instructions	1. [ ]	2. [ ]	3. [ ]
3	Activities of your job description	1. [ ]	2. [ ]	3. [ ]
4	Rules and regulations	1. [ ]	2. [ ]	3. [ ]
5	Policies	1. [ ]	2. [ ]	3. [ ]

APPENDIX B

Classification of the questions of the questionnaire

Questions on How to evaluate the elements of the organisation structure?

Element of the Organisation Structure	Question	Likert Scale				
Formalization	**Was any change happened to the following elements to your job with the implementation of new ERP system in your organization?**	Decreased				Increased
	Standard Operating Procedures(SOP)	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Standing Instructions	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Activities of your job description	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Rules and regulations	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Policies	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]

Centralization	**Do you agree with the following results occurred with the implementation of new ERP?**	Fully Disagree				Fully Agree
	Your superior makes most of the decisions relating to your job role than before	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	You have less authority than before in carrying out activities relating your job	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Your responsibility relating to your job is decreased	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]

Specialization	Always there will be a stop in the operation if you do not do the transactions online in the system	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	In order to do the transactions online in the system always some others should complete their online transactions before hand	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]

Element of the Organisation Structure	**Question**	**Likert Scale**				
Chain of Command	With the implementation of the new ERP have you experienced the following					
	Change of immediate superior	Yes [ ]	No [ ]			
Span of control	With the implementation of the new ERP have you experienced the following					
	Number of subordinates	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
Chain of Command	Creation of new positions in the organization	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
Departmentalization	Creation of new departments in the organization	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Transfers to new departments	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]

Element	**Question**	**Scale**				
		very Low	**Low**	**Moderate**	**High**	**very High**

Performance	**ERP helped in saving end user time**					
	Simplification of day to day tasks (user task)	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Reduction of Paper work	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Improved single point data entry and eliminated non value adding tasks in the operation	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Easiness to obtain the information, which could be obtained earlier, only from other departments, now available over the system	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Up to which level that you are feeling of ownership improved among the functional heads and end users	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Improvements in the interdepartmental relationship	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Improvements in the individual productivity	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Improvements the group/departmental productivity	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
Tangible Benefits	**Is your organization experience following benefit with the implementation of the new ERP?**					
	Reduction in planning cycle time	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Reduction manufacturing cycle time	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Improvement of customer service	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Decreased lead time	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Reduced cost of serving customers	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Reduction of inventory	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Reduction in error in ordering material(Procurement)	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Increase throughput time of the operation	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Increase in sales volume of the organization	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Facilitate to improve the competitive position of the organization in the industry	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Supports in improving communication over the supply chain	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
Intangible Benefits	Improves the better coordination in between functional managers	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Improved forecasting	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Reduction information delay	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Improvement decision making	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Streamline the business processes	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Increase overall satisfaction with business Processes	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]
	Improve the whole organizational processes	1. [ ]	2. [ ]	3. [ ]	4. [ ]	5. [ ]

Questions on How to evaluate the Benefits and Performance of the ERP implementation?