The Impact of Enterprise Resource Planning (ERP) Systems on the Performance of Academics within the Context of Universities in Saudi Arabia

MOHANAD HUSAIN ALHEBISHI

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ABSTRACT

This study investigated the impact of Enterprise Resource Planning (ERP) on the performance of academics in Saudi Arabian universities. It identified the factors that significantly impact the academics' performance while using ERP systems in the context of Saudi universities within the Higher Education sector, which will enhance and increase the universities' overall performance. It developed and validated a model that portrays the critical factors, which significantly impact academics' performance while using the ERP systems in the Saudi universities context.

The literature reveals that there is a limited consensus of views on ERP research and that many studies fall short of providing empirical evidence about the practical implications, failure rates and users' evaluation of the systems. ERP research tends to be polarised between the critics who see its benefits as rather limited and others who believe ERP is a multi-dimensional and complex system, which can successfully be implemented and evaluated.

The combination of quantitative and qualitative approaches provides an in-depth investigation of the factors that significantly impact academics' performance while using ERP systems within the context of Saudi universities. Data were collected using a questionnaire involving 457 academic users. This was supported by qualitative data using semi-structured interviews with six participants and public documentation.

The findings of the quantitative phase revealed that there were nine significant factors related to both dimensions, system quality and service quality, which impact the academics' performance while using ERP systems. The factors were timeliness, ease of use, currency, training, compatibility, tangible, empathy, assurance and responsiveness. However, other factors such as flexibility, authorisation and reliability were not significant in the current context. These findings were consistent with those of the qualitative phase, which gave more insights into the findings of the study.

This study has provided a platform for further in-depth research into the users' evaluation of ERP systems in the context of Saudi universities, by expanding the literature, which will benefit future research. In addition, the theoretical contribution for this study is providing an examination of the viability of the model of research proposed, using the example of Saudi universities, for explanation of the factors that have a direct and significant influence on academics' performance when using ERP systems. Moreover, another important contribution to existing theory from this study is research model validation through the collection of empirical data from academic members of staff within a developing Middle Eastern country, Saudi Arabia. The practical contribution for the current study is that the proposed model can be applied by the decision-makers and academics in universities to coordinate their efforts to effectively support the ERP systems in order to increase the universities' overall performance.

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DECLARATION

I hereby declare that this thesis has not been submitted in support of an application for any other degree or qualification at any other university or academic institution. In addition, I hereby declare that this thesis and the work presented in it, is my own work and all other works done by others have been cited.

Signed: Mohanad Alhebsi

Date: 12/01/2018

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LIST OF ABBREVIATIONS

ABM	Activity Based Management	**KSA**	Kingdom of Saudi Arabia
ACP	Academics' Confidence and Performance	**LJMU**	Liverpool John Moores University
AGFI	Adjusted Goodness of Fit	**SCITC**	Saudi Communications and Information Technology Commission
AIPS	Ability to Identify Problems and Solutions	**MIS**	Management Of Information Systems
AMOS	Analysis of a Moment Structures Programme	**MOE**	Ministry of Education Saudi Arabia
BPI	Business Process Improvement	**MOMC**	Multi-Objective or Multi-Criteria
BSC	Balanced Scorecard	**MRP**	Material Requirement Planning
CBA	Cost Benefits Analysis	**MRPII**	Manufacturing Resource Planning
CDSI	Central Department of Statistics and Information	**NFI**	Normed-Fit Index
CFA	Confirmatory Factor Analysis	**OPEC**	Organisation of the Petroleum Exporting Countries
CFI	Comparative Fit Index	**PCA**	Principal Components Analysis
CIA	Central Intelligence Agency	**PMI**	Project Management Institute
CIT	Communication and Information Technology	**QS**	Questionnaires
CSFs	Critical Success Factors	R^2	R-Squared
D&M	DeLone and McLean's Information Success Model	**RDC**	Research Degree Committee
D^2	Mahalanobis Distance	**RMR**	Root Mean Square Residual
DSR	Deanship of Scientific Research	**RMSEA**	Root Mean Square Error of Approximation
DV	Dependent Variable	**ROI**	Return on Investment
EFA	Exploratory Factor Analysis	**ROM**	Return on Management
ERP	Enterprise Resource Planning	**SA**	Systems Awareness
EUCS	End-Users Computing Satisfaction	**SABIC**	Saudi Arabian Basic Industry
EUS	End-Users Satisfaction	**SAMIRA D**	Saudi Arabia Market Information Resource
FA	Factor Analysis	**SAR**	Saudi Arabian Riyal
GFI	Goodness of Fit	**SEM**	Structural Equation Modelling
HEIs	Higher Education Institutions	**SMART**	Strategic Measurement of World-Class Manufacturers
IAP	Improve Academics' Performance	**SPSS**	Statistical Package for Social Sciences Programme
ICT	Information Communication and Technology	**SRMR**	Standardised Root Mean Square Residual
IPMS	Integrated Performance Measurement Systems	**TAM**	Technology Acceptance Model
IRI	Immediate Recall of Information	**TQM**	Total Quality Management
IS	Information Systems	**TTCT**	Time Taken to Complete Tasks
IT	Information Technology	**TTF**	Task-Technology Fit
IV	Independent Variable	**UK**	United Kingdom
KMO	Kaiser-Meyer-Olkin	χ^2	Critical Value with Degree of Freedom

CHAPTER ONE: INTRODUCTION

1.1 Aim of the Study

This study aimed to investigate the impact of Enterprise Resource Planning (ERP) systems on academics' performance in Saudi universities. The system of Enterprise Resource Planning (ERP) has emerged as a driver for cost effectiveness and as a necessary strategy amongst small and medium enterprises to boost their performance and to enable them to remain competitive in today's unstable and complex economic environment. ERP is generally viewed as an essential infrastructure and is also a strategic instrument in automating business processes. Currently, Saudi Arabia's (SA) universities function with a mixture of various systems that are operated or managed with divergent business processes. Sometimes these systems are linked with each other and sometimes they are not; sometimes they are loosely connected and sometimes they are more tightly interfaced. Adopting ERP systems will enable harmonisation and provide a mechanism for implementing systems with a high degree of integration and application. The rapid pace of change in the world means that the Saudis must adapt and learn to embrace change in a dynamic way. Factors such as economic volatility, globalization, fluctuation of oil prices and technology demand changes within the environment, particularly within the universities, and have a direct impact on organisation performance (Shang and Seddon, 2000). The recent massive drop in oil prices has emphasised the need for ERP at all levels to ensure the following: (1) cost reduction; (2) cycle time reduction; (3) productivity improvement; (4) quality improvement; (5) customer services improvement.

Al-Mashari et al. (2003) echo this saying that one of the biggest advantages of the implementation of ERP is the re-engineering of the whole organisation's processes to comply with the ERP resulting in a change of the business culture. Many oil-producing countries are beginning to plan how to address the shortage of oil revenue as a result of a sharp fall in oil prices and prepare for the scenario of a future with low oil income. This study has examined the importance and benefits of introducing an ERP system in the university context to enhance the performance of academics and demonstrates why Saudi universities need ERP systems. It also seeks to find out the factors that significantly impact academics' performance and productivity while using the ERP systems.

1.2 An Overview of Key Literature

Despite the breadth and depth of the literature on Enterprise Resource Planning (ERP), this area of research is still topical and generates plenty of interest in today's complex world of work and business. ERP as a research area is extensive as it touches on several ERP system implementation issues that have been researched from different angles and under diverse theoretical perspectives, dealing with aspects such as: attribution, adoption and the implementation process (Nandhakumar, 2004; Butler and Pyke, 2003); project design or accomplishment (Laframboise, 2002); organisational influence (Westrup and Knight, 2000); predicting the probability of success (Magnusson et al., 2004); advancement towards e-commerce (Schubert et al., 2004; Kemppainen, 2006; Schubert, 2003).

Moreover, over the last few decades ERP systems have contributed significantly in their supportive role in driving employee performance and in enhancing efficiency in most of the major industries including airlines, telecommunications, transport, education and government (Judith, 2005; Mehlinger, 2006; Garcia-Sanchez and Perez-Bernal, 2007). ERP systems have been one of the most relevant systems and are implemented because of their potential to result in better performance (Eric et al., 2007) by facilitating organisational operations and supporting to achieve various organisational targets with efficiency and effectiveness. As a result, there is a plethora of approaches to understanding and explaining ERP and as a topic of study it may be considered 'over-researched.' Given the broad literature that already exists on ERP, the question is what is there left to say? Yet ERP in Saudi Arabia, and the Middle East in general, remains under-researched and to be explored and tried.

ERP systems are defined and explained in hues of meanings. Different authors, use different labels to suit their agenda and their purpose. Some of these labels refer to enterprise systems, enterprise wide-systems, enterprise business-systems, integrated vendor software, and enterprise application systems. However, despite their variations, many of the definitions are overlapping or similar with no significant fundamental difference (Al-Mashari et al., 2003). Rosemann and Wiese (1999, p. 66) define the ERP system as a "*customisable, standard application software which includes integrated business solutions for the core processes such as production planning and control, and warehouse management and the main administrative functions such as accounting and human resource management of an enterprise.*

Using different wording but signifying the same, Gable (1998, p. 3) views ERP as *"a comprehensive package of software solutions which seek to integrate the complete range of business processes and functions in order to present a holistic view of the business from a single information and IT architecture*".

To be more specific, ERP systems in universities context can be defined as:

> A comprehensive and customisable set of integrated applications that enable universities to control all key functions such as students' administration and academics' payroll by using a unified information architecture, which will reduce time taken to complete tasks, increase productivity and performance and finally recall the accurate information by the different university's stakeholders such as academics, students and employees (Abugabah, 2014).

Thus, in essence, ERP aims to increase operational efficiency by improving business processes and decreasing costs (Nah et al., 2001; Beheshti, 2006). Moreover, ERP acts as an organiser and coordinator as it allows different departments with diverse needs to communicate with each other by sharing the same information in a single system. ERP thus, increases cooperation and interaction between all business units in an organisation on this basis (Harris, 2004).

Although ERP as a mechanism is intended to optimise the business processes and transactions in an organisation, it can be helpful and useful (in theory) as it addresses the problem of fragmentation of information in organisations (Abugabah, and Sanzogni, 2009). Research on ERP also showed that organisations adopting ERP systems, experience a great variety of results, ranging from implementation failure to gaining some competitive advantage. In addition, the ERP key debate is still ongoing regarding the various contributions of ERP systems to performance and the actual benefits and impacts**.** Therefore, ERP is a research area that has been studied from different perspectives and in many contexts and sectors of activity. It is a topic, which continues to evolve and attract attention from researchers and business experts because it is pertinent for all organisations. In addition, researchers have examined many key aspects related to ERPs ranging from pre-implementation requirements to successfully implementing ERP projects with minimum costs. In particular the majority of studies on ERP (Basoglu et al., 2007; Botta-Genoulaz and Millet, 2006; Botta- Genoulaz et al., 2005; Somers et al., 2000) have focused on: critical success factors of ERPs; their various implementation phases; the nature of the challenges and barriers; conditions of success and reasons of failure; ERP optimisation; management through ERP; the ERP software.

This study has established to provide fresh insight into the ERP system's impact on academics' performance within the Saudi universities context. The primary aim is to investigate the impact of ERP systems factors that achieve the highest of academics performance in order to enhance the chance of its success and to meet the high expectation of the academic staff. This will be accomplished in part, through the development of a model.

As a starting point, this research has consisted of the collection of demographic and perspective data about the ERP system's academic staff users in Saudi universities. Afterward, the collected data will be used to explore the ERP system's impact on academics users' performance. In addition, this research has empirically studied the applicability of the adopted theoretical framework by Althonayan and Papazafeiropoulou (2013) for evaluating the impact of the ERP system on higher education stakeholders, which was built by the integration of three widely accepted models in the information systems literature: Delone and Mclean's information system success model (D&M) (1992, 2003); the Task-Technology Fit (TTF) model (Goodhue, 1995); and the End User Computing Satisfaction (EUCS) (Doll and Torkzadeh, 1988). As a result, this study has enriched the literature by providing insights from a Middle Eastern perspective and raise awareness of key stakeholders in Saudi universities, especially academic staff in order to highlight the significant factors that impact academics' performance while using ERP systems.

Globally, Enterprise Resource Planning systems (ERP) provide organisations with a set of integrated applications that run the following business functions: human resources, accounting, controlling, registration, managing the affairs of students, academics, and facilities; these systems are linked by a common database, which allows the sharing of data (Almahdi, 2010). This can result in the need for adoption to cope with the fast development of the technology. Public contexts such as government ministries and universities have identified the need to implement ERP systems in their functional operations in order to develop the most accurate and fast quality services to the public.

In universities, ERP systems have influenced many phases, in both external and internal operations during their successful implementation that is reflected in the universities' performances (Swartez and Origall, 2000 and Tsai et al., 2011). The implementation of ERP systems has been instrumental in the positive results shown in some highly ranked universities around the world; thus, some universities such as Cranfield University in England have been established to follow the top ranked universities in order to improve the services and processes for the academic staff and the students (Lyytinen and Newman, 2015). Additionally, in recent years, Middle Eastern universities in the public sector have been looking forward to improving and redesigning their procedures and functions by implementing technically advanced tools of which one is ERP systems (Rabaa`i et al., 2009).

Despite the features of ERP systems, especially in the context of universities worldwide, serious problems were expected and appeared in the implementation phase. One of the challenges includes meeting stakeholders' expectations in universities; the reason behind this challenge is that most universities have, for a decade, shown unique structural frameworks (Pollock and Cornford, 2004; Abugabah, 2014). Therefore, there is no systematic approach to measure the performance of universities where ERP systems have been implemented. Additionally, stakeholders such as academic staff, employees, and students have played an important role in the universities' context compared to organisations in other contexts; this is because each university or institution has its own multiple end-users account in the ERP systems and this has been shown to differ according to background, responsibilities, tasks, goals and approaches to practice (Wagner and Newell, 2006; Bhamangol et al., 2011).

In short, the ERP literature shows inconsistency in examining the relevance and success or failure rates of ERP systems. There are conflicting views and contradictory strategies regarding the most suitable approach to evaluate ERP systems from the different perspectives (technical, social, and individual). The main focus of previous studies was either on critical success factors or implementation issues and/or on user acceptance and satisfaction. The key issue, it seems, is that universities must take into account the ERP systems users' expectations to achieve the highest performance. It will also be seen from the literature that identifying the factors which can affect the performance of universities' stakeholders, is necessary and may hold the answer that will help a university to define the right approach. Whilst the significance of ERP systems' internal and external contextual factors have been widely debated by researchers, the majority of the studies are within the private context with only little research on the public universities' context.

1.3 Research Background

The Saudi Arabian public education system includes 27 public universities, 9 private universities, 36 colleges (Ministry of Education Saudi Arabia, 2015) and a large number of schools and other institutions. The system is open to all citizens, and provides free education, books and health services. The Saudi Communications and Information Technology Commission (SCITC) (2014) stated that Saudi Arabia (SA) is one of the developing countries, which spends 20 billion US dollars per year on technologies investments in its public sectors. SA has twenty-five universities that could be divided in two categories: newly launched (10 years old or less) and old universities (50 years old or more). All twenty-seven universities, either new or old are fully owned by the government of SA and are managed and controlled by the Ministry of Education of SA. The Ministry of Education supplies the universities with an annual financial budget and each university has independent administration, and has the authority to implement and apply their decisions (Ministry of Education Saudi Arabia, 2015).

Taibah University, which can be considered as one of the recently launched universities, was established in 2003 and it has more than twenty colleges and 1486 academic staff. On the other hand, King Abdulaziz University, which is one of the oldest universities, was established during the middle of the last century and it has more than 7000 academic staff.

1.4 Statement of the Problem

In recent years, ERP system implementation has grown quickly in the public sector in general and in the SA universities context particularly. However, little research has been conducted on this issue (Rabaa`i, 2009; Kallunki et al., 2011). There is obvious governmental support for applying new Information Technology applications and relying more on the Internet to conduct business and financial transactions (Minister, 2015; Alhirz and Sajeev, 2015; Abugabah et al., 2015). As a result, the Saudi government has budgeted $54.4 billion for universities, technical and vocational training, teacher training, improvement of academic curricula, and allocations to boost technological advances at new research centres in 2015/2016 (Ministry of Education Saudi Arabia, 2016). Given this huge investment, it is critical that an evaluation of this expenditure is undertaken to assess the success of these initiatives.

There is clearly growing pressure to improve and deliver the quality of performance by academics within the universities' context in line with the Saudi Arabia 2030 Vision. This research has evaluated the implementation of ERP systems and assessed the flaws in the implementation process.

The traditional and conventional structure at many Saudi universities has contributed to the dissatisfaction in applying the ERP key principles. The introduction of ERP has faced some bureaucratic machinery, which slowed its implementation due mainly to resistance to change. The adoption of ERP at Saudi universities has not witnessed a great success because the level of readiness for implementing ERP systems has not been created.

Howcroft et al. (2004) highlighted that it is important to focus research on the design, implementation, use and evaluation of ERP systems within and across contexts. This matches with what Finney and Corbett (2007) reported that ERP implementations failed to achieve the organisation's targets and expectation, because a project is not complete without post-implementation evaluation. According to Khalifa et al. (2001), there was sufficient evidence in the Information Technology (IT) literature to suggest that IT system users are excluded from the evaluation process, especially when traditional methods focus on technical factors and direct costs rather than on human aspects. More recently, Althonayan and Papazafeiropoulou (2013) asserted that there is still a lack in the evaluation of ERP systems' impact on the different stakeholders' performance in general, which suggests that measuring the impact of ERP on the different stakeholders, especially in the context of universities, is in all likelihood still required. In fact, Abugabah et al. (2015) reported that there is still a general lack of awareness about the importance of evaluating ERP systems from the users' perspectives.

Up to the present, our understanding regarding this issue is still limited owing to the lack of a nationwide empirical research in developing countries, precisely, in the Saudi universities' context. To fill this knowledge gap, it is vital to investigate the variables that are related to ERP systems, which affect academics' performance in universities. As a result, studying the impact of ERP systems on the main and most important universities' stakeholders (academic staff) is deemed a worthwhile undertaking, especially with the lack of such comprehensive studies in the country's context. Furthermore, this study has provided a deep understanding of the variables that affect academics' performance while they are using the ERP systems in universities.

1.5 Research Objectives

As the main aim for this study was to investigate the impact of ERP systems on academics’ performance within the Saudi universities context, in order to achieve this research the following objectives have been developed:

- To identify the current problems and challenges hindering the implementation of ERP within the Saudi universities’ context as an example of a developing Middle Eastern country.
- To determine the factors influencing academics’ performance while using ERP systems in the context of Saudi universities, as an example of a developing Middle Eastern country.
- To highlight any differences among the different groups of academics regarding their attitudes regarding their performance as a dependent variable while using ERP systems.
- To develop and test a model that portrays the critical factors which significantly affect academics’ performance while using the ERP systems for the context of Saudi universities from the perspective of academics’ attitudes and perceptions.

1.6 Justification for the Study

The motivation behind this study was to examine the importance and impact of ERP on academics within the Saudi universities and the extent to which ERP systems enable them to enhance their performance. It is anticipated that this project has extended the knowledge of the impact of ERP systems on academics’ performance in public universities in developing countries, particularly in the context of Saudi Arabia; this can be achieved by investigating the range of variables that strongly affect academics’ performance in the universities context. Moreover, the study has developed a model that help Saudi universities, as well as other developing countries’ universities with a similar context, in order to fulfil the academics’ expectations and needs.

In conclusion, this research has academic value because, as far as the literature is concerned, the study will contribute to the ERP debate and provide deeper understanding of the factors affecting the academics’ performance in the context of universities. In addition, with access to academic staff, it is the first study to explore the impact of ERP systems on academics’ performance regarding the Saudi universities' context. This study has sought to develop strategies/suggestions that will help Saudi universities to improve academics' performance in the post-implementation phase of ERP systems.

Finally, findings should benefit similar developing countries that are located in the Middle East region which have similar characteristics to Saudi Arabia. Therefore, the contribution of the current study will not only enrich the literature, but also benefit future researchers, studies and investigations to produce practical suggestions on how to enhance academics' performance and other end-users' performance by using better and effective ERP systems.

In the context of investigating ERP systems, much of the research has been conducted in developed countries. However, in developing countries, particularly Saudi Arabia, investigating the post-implementation impact of ERP systems on universities' stakeholders is under-researched and the specific knowledge is limited concerning the variables that affect the academics users' performance in universities when using ERP systems. Therefore, in order to address the current research gap, this study will investigate the impact of ERP systems on academics' performance within the Saudi universities' context.

1.7 Research Methodology and Methods

The current research methodology has been selected in line with the aim of this research, which is investigating the impact of ERP systems on academics' performance in the context of the Saudi universities and the objectives. In order to achieve this aim and the objectives in this current research, a well-defined research methodology is necessary. According to Eldabi et al. (2002), a clear methodology is considered to be the right pathway to direct a researcher to achieve his/her objectives and goals. Therefore, the methodology/method chapter in this present study will highlight the selected research style, research purpose, research approach, research strategy, data collection, sampling, and data analysis techniques.

To investigate the impact of ERP systems on academics' performance in the universities' context, the researcher justified a positivist paradigm, which will guide the investigation in the research. Moreover, the research approach will be a deductive approach. By following this approach, it is the intention that quantitative and qualitative methods will be combined to produce sound sociological explanations. This means that quantitative data will be collected and, where necessary, qualitative data will be collected (in order to increase a deeper understanding and fill the gap that could appear in the quantitative data) in different phases using survey research strategy. The data will be analysed separately and finally triangulation of the results will be made.

1.7.1 Data Collection

This section briefly discusses how the data for the current study will be collected and who will be the targeted sample. As a starting point, Denzin and Lincoln (2005) highlighted that there are two types of data collection approaches when collecting research data: quantitative and qualitative. In the quantitative approach, the survey instrument emphasises quantitative analysis, whereby data on a large number of organisations are collected through methods such as postal questionnaires, telephone interviews or published statistics, then analysed using statistical techniques (Gable, 1994). A questionnaire can be used to help policymakers, programme planners, evaluators and researchers. On the other hand, interviews are considered as one of the most important and essential sources to acquire in-depth information about a problem, and discover underlying motives, feelings, values, and perceptions (Hair et al., 2010; Yin, 2013). In fact, it is possible in business research to use a combination of quantitative and qualitative research approaches, where the investigation can be built on the strength of each type of data collection and which minimises the weakness of each single approach (Patton, 2002). Many scholars have stated the importance of mixed methods and their benefits in contrast to single-methods. Moreover, they extended this combination to the integration and building of data, a method called 'triangulation' (Jick, 1979; Creswell et al., 2003; Johnson et al., 2007). The simple and common idea about triangulation is to use a combination of methods in order to achieve quality in research that cannot be guaranteed by using a single method (Sarantakos, 2012; Flick, 2014).

This research used a mixed method data collection approach. This mix method includes self-administered questionnaires, which have been sent to a sample of academics and have been followed up by the researcher in order to collect the returned questionnaires from the participants. Most of the questions within the questionnaire were built with adaptation of the work of previous studies and different scholars have validated all the questions. In addition, these questions have been modified to fit the aim of this study.

The quantitative method has been selected as the primary method for the current study, and has been justified in the methodology chapter showing that the quantitative method is the most appropriate primary method that fits the natural line of the current study. However, the quantitative data sometime did not explain all issues that could occur in a specific phenomenon. Therefore, the justification behind choosing the qualitative method along with the quantitative method was to give a better and a deeper understanding of the individual perceptions of the impact of ERP systems on academics' performance. Semi-structured interviews have been employed because the researcher has gathered the quantitative data as part of the study evidence. Moreover, choosing this kind of interview clarified any quantitative information or data emerging during the analysis of the questionnaire results. Therefore, the quantitative and qualitative data will be collected in different phases using questionnaires and semi-structured interviews, analysed separately and finally results will be related to each other. In conclusion, such collaboration/ integration between the quantitative and qualitative data will increase the reliability and validity of the current study in order to address the research question, using evidence through methodological triangulation and achieve the objectives of this study (Patton, 2002; Yin, 2013).

1.8 Structure of the Thesis

This section outlined the structure of the current study and describe the content of each chapter. The current thesis contained eight chapters, which can be outlined as follows;

- **Chapter One (Introduction):** provided a general background of the topic under consideration, clearly indicating the research motivation, highlighting the research aim, objectives, and questions. It also demonstrated the selected methodology in order to achieve the objectives and answers the research questions.
- **Chapter Two (The Context of the Study):** provided an overview of the Kingdom of Saudi Arabia. This included the historical background of the kingdom, several environmental factors such as location, religion. Moreover, this chapter demonstrated the economic environment as well as the new vision of the Kingdom of Saudi Arabia 2030. Finally, an overview of the

Information Communication Technology sector and the higher education system in the Kingdom has been highlighted.

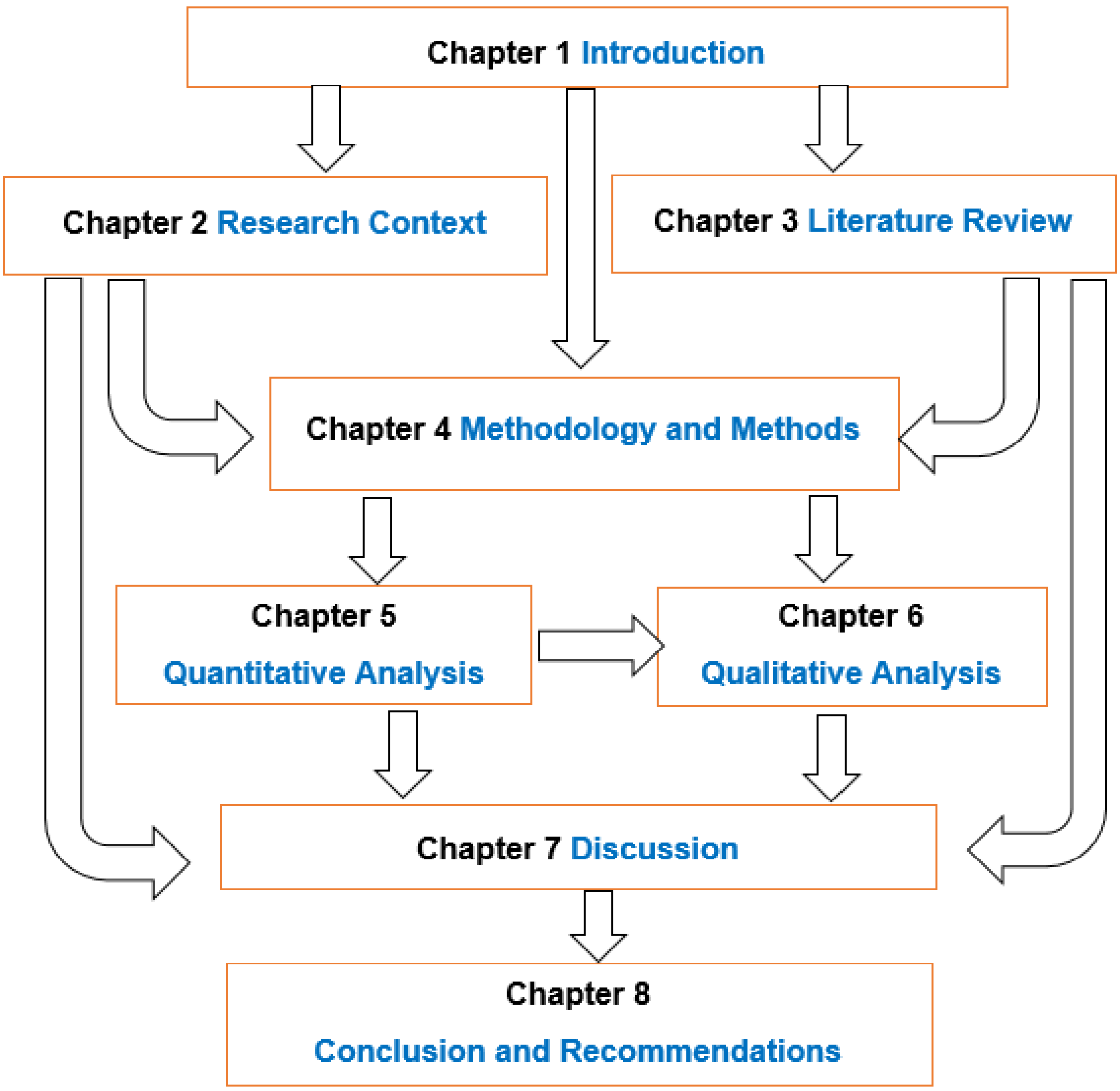
- **Chapter Three (Literature Review):** critically reviewed the literature related to the Information Systems/ERP system, the evaluation and the measurement of the ERP system's performance for its end-users. It appraised the related debates and links and contrasts between authors regarding ERP. The literature informed the research objectives and lists gaps in previous studies, adding value to the current research. The literature review was therefore, segmented into the following core areas/concepts: ERP theories and models; the gaps in related studies; the conceptual framework.
- **Chapter Four (Methodology and Method):** discussed the selected research methodology and methods to reach the aims and objectives of the current study. Moreover, this chapter was divided into several main sections including an introduction to philosophies, methods of data analysis, and detailed discussion of both quantitative data, qualitative data and mixed methods, sampling and pilot study.
- **Chapter Five (Quantitative Analysis):** provided a descriptive analysis and inferential statistics about the perceptions of the research sample relative to the ERP system's impact on their performance. It analysed the factors that have strongly influenced their performance while they were using the implemented ERP systems in their universities.
- **Chapter Six (Qualitative Analysis):** presented the analysis of the qualitative data collected via semi-structured interviews with six academics in different Saudi universities. The main goal of this analysis was to support the quantitative results.
- **Chapter Seven (Discussion of Data):** interpreted the final results that have been obtained from both instruments of the empirical research, which were the questionnaire and the interviews. The discussion of the findings is linked to the existing literature in order to highlight whether the previous studies support the findings or confirm the results as something unique.
- **Chapter Eight (Conclusion and Recommendations):** drawn a meaningful conclusion based on the findings and the discussion chapter. Moreover, it suggested several recommendations that would help the policy makers within the universities' context in order to enhance the implemented ERP

systems. Finally, this chapter highlighted the contribution to knowledge that can be gained by the current study as well as the limitations of the study and suggestions for further research.

1.9 Summary

This chapter highlighted the introduction of the current study. Moreover, it formulated the statement of the research problem, the significance of the study particularly within the Saudi context, the aim of the study, objectives, research questions and finally the structure of the current thesis. This chapter also provided a brief introduction and background to the study, which aims to highlight the benefits and address the barriers and challenges of implementing ERP. The following figure (1.1) portrays the structure of the study.

Figure 1.1: A Flowchart of the Current Study Structure



CHAPTER TWO: RESEARCH CONTEXT

2.1 Introduction

This chapter aims to provide some background about the country in which this study is conducted. It presents the Kingdom of Saudi Arabia (KSA) in terms of its geographical background and population, and its related educational, economic, cultural and political factors to provide a broad picture of the environment and research context that have a direct bearing on the topic under consideration.

Generally, ERP systems have been adopted by many countries within their public and private sectors in order to improve accessibility, quality effectiveness, ease of use and flexibility of the provided services, which will decrease the general spending costs. Despite the huge number of automated and integrated systems that have been implemented by different countries around the world, there is no universal model that can be adopted without several modifications in order to make the systems more suitable and appropriate for the cultural, social, political and economic characteristics of the country where it has been implemented (Wickramasinghe and Hopper, 2005). These factors, such as cultural, economic, political, social and religious, may produce great challenges for the working environment and organisations. They could also affect individuals within organisations. Therefore, this chapter will describe the main characteristics of Saudi Arabia, which will be the context of the current study. This chapter will introduce important points, divided into four main headings: Saudi Arabia in general; Saudi Arabia’s main characteristics such as location, demographic and cultural information and the economy of the kingdom of Saudi Arabia including the new Vision 2030, the Information Communication and Technology (ICT) sector in the kingdom: and finally higher education in Saudi Arabia.

2.2 Kingdom of Saudi Arabia

The Kingdom of Saudi Arabia is known as Saudi Arabia or Saudia. It is one of the largest countries in the region of the Arabian Gulf and the largest in the Middle East. However, 95% of the Saudi territory is desert and semi-desert (Central Department of Statistics and Information, 2010). The land of Saudi Arabia covers approximately 2,2250,000 square kilometres, with the Arabian Gulf to the east and the Red Sea to the west, and borders Kuwait, Iraq and Jordan to the north, Qatar, United Arab Emirates and Bahrain to the east and Yemen and Oman to the south. In 1932, King Abdulaziz Al-Saud gave his name to the Kingdom after successfully unifying all the cities, villages and tribes under his command (Saudi Arabia Market Information Resource, 2015). King Abdulaziz died in 1953, and his sons have continued to rule. Saudi Arabia owes its importance to three main reasons:

Religiously, the prophet of Islam Mohammed (peace be upon him) was born and raised in Makkah, which is located in the western region of Saudi Arabia. Therefore, millions of pilgrims travel annually to Saudi Arabia particularly to visit the holiest two cities for Muslims (Makkah and Al-Madinah Al-Mounawarah) in order to practice religious observance (Alsaggaf, 2004).

Economically, in 1936, oil was discovered and by 1950 Saudi Arabia was considered as one of the leaders in the export of crude oil, owning at least 25% of the world's oil reserves. The profits of the oil industry in Saudi have been spent and distributed to various sectors in order to enhance the development of the country. The profits have been used to diversify the economy as well as change the Saudi land from a desert to cities with all the facilities such as roads, parks, infrastructure, schools, universities, hospitals and providing all the other utilities required for its citizens and visitors.

Geographically, Saudi Arabia plays an important role in international trade because of its strategic location near the Red Sea ports, acting as a link between the two continents of Africa and Asia, and has been used to transport goods from India, China and Europe. The following figure (2.1) shows the map of Saudi Arabia:

Figure 2.1: Map of the Kingdom of Saudi Arabia

Source: (Ezilon, 2016).

2.3 Saudi Arabia: Main Characteristics

The Kingdom has implemented a monarchy as its regime and the king has to be one of King Abdul-Aziz's sons. The current monarch is King Salman bin Abdul-Aziz Al-Saud who became king after the death of his brother King Abdullah bin Abdul-Aziz in 2014. Regarding the context of the current study:

2.3.1 Location

Geographically, Saudi Arabia can be divided to four main parts or regions, which are the Najd hills in the centre, Tohama plains are situated in the southwest part, the mountains in the north, and finally the Empty Quarter desert. The capital is Riyadh, which is located in the centre of Saudi Arabia.

2.3.2 Demographic

The population of the kingdom has reached 31,015,999, which comprises some 20,774,906 million Saudi citizens, and thus around 67% of the total population are Saudi citizens (General Authority for Statistics, 2016). There is no significant difference between gender percentages in the total population in Saudi Arabia, with 43% female and 57% male. Also, the different classifications of the age groups shows a higher percentage of 11% for the age group 25-29 years old and the lowest percentage of 0.33% for the age group more than 80 years old (Ibid). As a consequence of the low percentage of older citizens, the adoption of e-portal services in the kingdom could be supported and successful as younger people have the capacity to accept changes in comparison to older people. Also the young and adults with a high income and good education become more accepting of the use e-services to accomplish their needs (Shelley et al., 2004).

2.3.3 Climate

Saudi Arabian weather during the year is hot, dry and harsh with temperatures that can reach 50 ºC during the daytime (World Fact Book, 2011). However, in the winter season the weather turns mild in the coastal cities and cold in the cities located near the desert. The climate is considered to play an important role in the acceptance by citizens of the implementation of e-governance services as well as other ERP systems, which allow the users to avoid the harsh weather in the kingdom and complete or request the needed services through the provided integrated systems.

2.3.4 Economy

Saudi Arabia has the Saudi Arabian Riyal (SAR) as the currency of the kingdom, which gains its strength from the exporting oil revenue that forms 90% of export earnings, 45% of GDP and 80% of budget incomes. The Saudi government has given attention to the petrochemical industry, natural gas, metal and iron in order to support the oil exporting income by other products. Many new industrial cities have been built and huge companies established to produce different petrochemical products to export worldwide. These industrial cities and companies are controlled by the public sector; however, the government has encouraged the private sector to invest in the country by facilitating them in order to benefit from the private sector motivation, decrease the unemployment rate and diversify the economic revenue for the kingdom. Based on its strong economy, the Saudi government invested in developing the infrastructure, services and education, which helped afterwards in the adoption of the e-portal services in the kingdom. In 2012, the United Nation produced a ranking for the world e-government readiness, which claimed that Saudi Arabia has become number 41 around the world in using the e-portal services.

2.3.5 Culture

Any new technology could be helpful or harmful for any society; however, the adoption of e-services in the kingdom had a great impact on the Saudi culture by making people more open minded, self-confident, more aware of personal characteristics and less inhibited about the opposite gender (Alsaggaf, 2004). The successful implementation of e-services may be influenced and delayed by various barriers such as cultural, organisational, individual and technical obstacles. Therefore, it is very important to study the different external and internal perspectives and factors that could affect the implementation phase of e-services as well as investigate the post-implementation of e-services from the perceptions of the different kinds of users (Al-Shehry et al., 2006; Al-Fakhri et al., 2008; Al-Shoaibi, 2008; Alshehri and Drew, 2010).

For instance, Al-Nuaim (2011) assessed several e-services provided by Saudi ministries from the perceptions of the citizens. The finding of the study highlighted that eight out of twenty-one websites of Saudi ministries do not provide the main e-services that citizens needed. Moreover, the results have shown that ten of the total websites provide only basic e-services, which should be provided in the first phase of implementing e-services, while three websites only provide one-way interaction, which is considered as the second stage of the implementation and the other six websites do not provide any e-services.

2.3.6 Political and Legal Structure

Nowadays, the kingdom is witnessing its third stage, which was established in 1932 by the King Abdulaziz Al Saud (Ansary, 2008). The current king, King Salman Ibn Abdulaziz Al Saud, is considered as the head of the executive power, the governmental Prime Minister and the leader of the Council of Ministers, which is considered as the highest legislative powers in the kingdom. Despite the power derived from the Council of Ministers, the system of the Saudi government is an absolute monarchy. Therefore, the kingdom follows a hereditary line of authority, which limits the dynasty's rights to the sons of the King Abdulaziz Ibn Abdulrahman Al Saud (the founder of the Kingdom), and the sons of his sons (Saudi e-Government National Portal, 2010). Additionally, there is a consultative council, which includes 150 members who have knowledge, experience and are specialised in different areas in order to support decisions or advise the king about ideas that could be beneficial for the society (Ibid).

2.4 Communications and Information Technology Commission in Saudi Arabia

The need to implement information systems and ERP systems in order to transform the paper and routine work into e-services has been acknowledged by the government of Saudi Arabia. Therefore, the Saudi government established the Communication and Information Technology Commission in order to control and manage the Communication and Information Technology implementation procedures in the late of 1990s when the Internet network became available in the country (Abanumy and Mayhew, 2005). A huge budget has been invested in information systems and its associated technology. In 2010, the government invested 7.2 billion dollars and this increased in 2015 to 12.3 billion dollars, which turned the kingdom into one of the fastest growing countries in the Gulf region (Saudi Communications and Information Technology Commission, 2015). This huge investment in Communication and Information Technology has been spent within different sectors such as building new smart and industrial cities, developing transportation, enhancing the healthcare system and improving the education system (Ibid).

Nowadays, the Saudi Communications and Information Technology Commission has redoubled its efforts in order to cope with the 2030 Vision of Saudi Arabia by automating all the government services in whole sectors to increase their productivity and the performance, which will enhance the economy and information society (Saudi Communications and Information Technology Commission, 2016a). Moreover, the Saudi Communications and Information Technology Commission has created a number of job opportunities for young Saudi citizens in the Communication and Information Technology market in order to develop manpower which can contribute and support the state economy, to increase the efficiency within the different sectors such as e-health, e-commerce, e-government and e-education (Alaboud, 2009).

2.4.1 Social Culture and IT

According to Narayan (2009), Communication and Information Technology adoption in the Gulf region is considered as one of the fastest developing markets worldwide. However, the organisational culture could negatively affect the implementation of the new technology. Therefore, some organisations could be susceptible to the threat of computer hacking whereby criminals gather data from a classified database in order to use them for their own purposes. Abu-Musa (2005) stated that it is hard to confirm whether data breaches are sometimes unintentional or deliberate. Nevertheless, whether the damage is accidental or deliberate through computer viruses or sharing password of users, the authorities have to review security around classified documents and information. Therefore, increasing society's awareness about the new technologies to build a healthy social cultural environment is essential; this will influence the manner of employees and the whole of society to drive the new technologies towards success. Moreover, it is important to study the level of satisfaction and the perceptions of the new technologies adopted from the perspective of the different users in order to avoid any failure in the post-implementation phase.

2.5 Economic Environment

This section will describe a general view of the economy, highlight the recent economic development and finally explore the new Vision 2030 for the kingdom.

2.5.1 An Overview of the Saudi Arabian Economy

The main income for the kingdom depends on exporting oil, which is fully controlled by the government. It is one of the leader countries in the exporting of petroleum as well as one of the important and powerful members in the Organisation of the Petroleum Exporting Countries (OPEC). Approximately eighty percent of the Saudi's budget revenues are gained from the oil sector, 45% of GDP and 90% of export revenues (Central Intelligence Agency, 2010). The main strategic economic plan for the kingdom is to reduce the dependency on oil exports, which can be achieved by establishing industrial diversification and by developing a highly skilled manpower specialised in management and accounting to support the economic diversity.

The kingdom has accomplished some objectives for economic diversification by building and establishing a company called the Saudi Arabian Basic Industries (SABIC), which is considered as one of the biggest companies in the field of petrochemical industries worldwide (Saudi Arabia Market Information Resource, 2015). As mentioned earlier, the government control and play a major role in most of the petrochemical industries. However, currently the government allows the private sector to invest in such industries in order to strengthen the economy and the diversification (Alahmad, 2010).

One of the obstacles that has been faced by the Saudi government and even the private sector is the lack of a highly skilled manpower. Unfortunately, the number of Saudi employees does not reach the required number; otherwise, the government plan would be achieved in a shorter time. Thus, the government and the public sector have relied on overseas human resources with high skills and experience (Alahmad, 2010).

2.5.2 Recent Economic Development in Saudi Arabia

Saudi Arabia has established a considerable number of development projects in most of the kingdom's territories. This has been supported by the high price of oil, which has increased the income for the kingdom. The following table (2.1) describes the main projects that have been developed by the government of Saudi Arabia:

Table 2.1: Recent Main Projects Established by the Saudi Government		
Project Name	**Description**	**Year and Location**
King Abdullah Financial Centre	The total construction area of the project is about 1.6 million square metres.	2007, in the capital city Riyadh
Communications and Information Technology Complex	This includes advanced infrastructure for the establishment of modern industries, to develop the IT sector in the Kingdom. The total construction area of the project is about 1 million square metres.	2010, in the capital city Riyadh
King Abdullah International Gardens	This project aims to improve recreation and tourism in the Kingdom. The total construction area of the project is about 2 million square metres.	2011, in the capital city Riyadh
King Abdullah University for Science and Technology	The main campus occupies an area of more than 36 million square metres	2009 in Thuwal City
King Abdullah City for Atomic and Renewable Energy	It aims to find alternative, sustainable and reliable sources of energy for generating power and producing desalinated water that will reduce consumption of the nation's fossil fuel reserves.	2010 in the capital city Riyadh
King Abdullah Economic City	This city will be ready to accommodate two million people. The stages involved in the completion will take 20 years	2006; and will last until 2025, in Rabigh City
Economic Knowledge City	The city is expected to attract investments worth 5 billion pounds and will provide 20,000 new jobs.	2010, in Madinah City

Source: (Saudi e-Government National Portal, 2016).

The huge development in Saudi Arabia requires a massive number of labourers to run the implemented projects. In order to meet the requirements, the government has allocated a huge budget to establish new universities and institutions to support the outcome of the current universities in the kingdom to reach the requirement number of skilled employees who can run all the new projects with their different specialisations.

2.5.3 Saudi Vision 2030

Recently the price of the oil in the market has rapidly dropped, which has influenced the development plans for the country as well as government spending. Many projects have been cancelled and others postponed for an unknown time, which has left the government to face many difficulties to solve as a result of the fall in oil prices. Therefore, The Economic Council and Development Affairs has produced the new vision of Saudi Arabia 2030, which mainly depends on reducing dependence on oil income (Saudi Vision 2030, 2017a). The Saudi Vision 2030 is based on three main themes, which are as follows:

Creating a strong foundation for economic prosperity, which can be done by a society that relies on the Islamic principle of moderation, proud of their identity and their good ancient cultural heritage and finally a society that is supported by an empowering social and health care system in order to maximise their performance and productivity.

A thriving economy will provide opportunities for the Saudi nation, which can be built by integrating the market requirement with the education systems in order to provide the needed outcomes for investors and entrepreneurs. Moreover, it will support small businesses as well as the larger companies to increase job opportunities, improve the business environment and enhance the quality of the provided services.

Finally, the third theme will focus on demonstrating/producing an effective transparent, high-performing and accountable government, which will provide the right environment for society, the private sector and the non-profit sector in order to encourage them to withstand their responsibilities and take the lead in facing challenges and seizing opportunities.

Additionally, in order to achieve the Vision of Saudi Arabia 2030, the Economic Council and Development Affairs has initiated the establishment of several programs. The following table (2.2) describes the most important programs for the Saudi Vision 2030.

Table 2.2: Several Important Programs to Achieve the Saudi Vision 2030

	Program	Description
Saudi Vision 2030	**Government Restructuring Program**	Globally, governments should be more flexible in order to face the unexpected challenges; therefore, the Saudi government has eliminated most of the supreme councils and launched the Council of Political and Security Affairs and the Council of Economic and Development Affairs. Both councils will support the strategic development, decision making and enhance performance.
	Strategic Directions Program	This program is aiming to approve all the strategic plans, which are determined by the different government departments and to review their plans in a way to link them with the vision of the future economic and social needs. All the decisions depend on the provided information, relevant performance indicators and the benchmarks.
	Fiscal Balance Program	It is one of the Council of Economic and Development Affairs' responsibilities, and examines the current capital, expenditures, the approval mechanism and the measureable economic impact for the kingdom. In 2015, the council has raised the non-oil incomes by thirty percent and the plan is to

		increase the non-oil profits by producing new measures in the coming years.
	Project Management Program	This program is keen to establish an expert project office in order to organise/manage the momentum and to ensure that all efforts are coordinated. This program also belongs to the Council of Economic and Development Affairs
	Strategic Partnerships Program	This program works to strengthen the strategic relationship between the kingdom and the other economic partners worldwide in way that improves the trade hub by linking the three continents and increases the exports, which will support the achievement of the Saudi Vision 2030.
	Privatization Program	This program aims to determine additional sectors suitable for privatization. In order to produce a comprehensive privatization, the kingdom will adopt the international best practices.
	National Transformation Program	This program aims to provide and organise workshops to evaluate the role of implementing the necessary initiatives for delivering on national priorities. Moreover, it produces opportunities for partnership with the private sector.
	Saudi Aramco Strategic Transformation Program	This program aims to transform the ability of the biggest organization in the kingdom (Aramco) to become one of the leading companies in other sectors beside the oil sector.
	Performance Measurement Program	This program adopts the principle of performance measurement for all the implemented governmental projects in order to evaluate the post-implantation for the new projects and to develop them constantly to cope with the principal of the Saudi Vision 2030.
	Regulations Review Program	This program aims to improve the regulations and the policy of the kingdom constantly such as the regulations for the non-governmental companies.

Source: (Saudi Vision 2030, 2017b).

2.6 Higher Education in Saudi Arabia

Since the revolution of Saudi Arabia started, there was no doubt about the importance of education and its strong relation to any successful improvement for any country and society. Therefore, in 1975 a royal decree was issued to establish the Ministry of Education in order to create and build the policy of the national higher education. Moreover, it has the authority to formulate the rules and regulations to monitor the higher education processes in order to ensure that the main goals for different universities and institutions have been achieved by providing highly skilled manpower for the different market needs, which will lead to a progressively sophisticated economy and prepare a national cadre specialized in the administrative and scientific fields. The Ministry of Education has become the powerful council for education affairs by controlling, supervising, planning and coordination of the main activities of all the universities and the institutions around the kingdom. Additionally, the Ministry of Education has adapted the American experience in education with some changes linked to the Saudi culture and customs.

Specialists in higher education believe that higher education is considered as a changeable field starting with privatisation, worldwide competition and ending by the changeable requirements of the labour market. Therefore, it has become essential for the higher education council to prepare and plan for the expected changes in order to cope with all the external factors such as the appearance of new fields, the increase of new student numbers and the strong competition among higher education institutions.

Several decisions have been taken by the council, which have been supported by the government by allocating a huge budget to implement them, for instance increasing the number of universities and launching an international scholarship programme to enhance the manpower in the kingdom by a different mentality and way of thinking and diversifying the disciplines to cover most of the market requirement of specialist human resources. As a result, currently, Saudi Arabia has 24 universities, six private universities and several community colleges in different cities, 37 health institutes and 12 technical colleges (Saudi e-Government National Portal, 2010).

Additionally, the scientific research department was given particular attention by the council because it makes an effective contribution in the development process. The following table (2.3) shows the number of academics in the government universities who can be considered as key in the education process in order to provide outcomes that suit the needs of the markets.

Table 2.3: Statistical Number of Academics in the Saudi Universities

Statistic	Total number
Number of Saudi Academics	31,918
Number of Non-Saudi academics	22,755
Total Number of Academics	54,673

Source: (Ministry of Education Saudi Arabia, 2016).

The government tends to automate its services in all sectors; therefore, a huge budget has been located for each department to design the best-fit systems that can be followed in order to achieve the government goal. In the case of the universities' context, several information systems and ERP systems have been adopted to serve the different stakeholders of universities. However, such systems need to be evaluated after the implementation phase in order to discover whether the implemented systems have satisfied the goals or not. One of the ways to explore such a matter is by investigating the perceptions of the end-users, which can provide important feedback that could improve the systems in ways that achieve their expectations and the main government targets by implementing the most suitable and successful systems for the Saudi environment.

2.6.1 Regulations and Policies of Saudi Universities

The Ministry of Education is considered as the legislative authority of the Saudi education system. As a part of the Ministry of Education's responsibilities, the ministry has created the Higher Education Supreme Board in order to set out the regulations for several practices within the universities' context, such as academic practices, including teaching, learning and students' activities, in addition to management practices such as admissions and employees affairs. The Higher Education Supreme Board has been given the power to become a direct authority, which holds the responsibility for the universities and other institutions that provide post-graduate studies within the Kingdom of Saudi Arabia. The main responsibilities for the Higher Education Supreme Board are highlighted in the following table (2.4):

Table 2.4: Five Main Responsibilities of the Higher Education Supreme Board

Responsibility	Description
Directing	This responsibility is aimed at directing and organizing all universities in the Kingdom, except the institutions that are subject to military control, by issuing policies that have to be applied across all universities without exception.
Monitoring	This responsibility allows the Supreme Board to monitor development and progress at each university.
Coordinating	This responsibility allows the Supreme Board to coordinate different matters, such as the award of degrees between two or more universities in the Kingdom.
Issuing	This responsibility allows the Supreme Board to issue the standard regulations that should be applied across the entire universities context.
Regulating	Regulate the standard financial affairs of all universities.

Source: (Ministry of Education Saudi Arabia, 2015).

2.6.1.1 Main Policies of Saudi Universities

The main policy aims to develop the context of universities that can be considered as a beacon of science and culture working under the guidance of educational law (Ministry of Education Saudi Arabia, 2015). In addition, each university is monetarily independent regarding its possessions and their disposal; therefore, each university has to implement the most appropriate procedures that suit its financial capacity, such as its educational policies, allocating the capacity for annual student admissions, the award of degrees, the progression of scientific research and providing community services (Ibid). However, top management positions in universities such as the University Chancellor and his/her deputies have to be filled by candidates recommended by the Higher Education Supreme Board, then the chosen candidate is appointed by a royal decree.

2.6.1.2 Budget

In the last decade, the number of Saudi universities has grown from eight to twenty-four universities, which cover most territories around the Kingdom. Thus, undoubtedly, the allocated annual budget from the Saudi government has rapidly increased in order to cover the needs of all public universities (Ministry of Education Saudi Arabia, 2016). In 2012, the government announced the largest budget that has ever been allocated for the Saudi universities at fifty-six (56) billion US dollars, distributed among them (Ibid). This has motivated each university to use its allocated budget to strive for excellence in its levels of academic services and training, in order to enrich the markets and the community with a highly skilled generation who can satisfy the public and private demand for capable human resources (Ministry of Education Saudi Arabia, 2016). As mentioned above, each university is financially independent. The profits and expenditure are determined by each university and then all the financial reports have to be approved by a royal decree (Ibid). Therefore, each university creates an estimated proposed budget statement including the needs and the expenditure for all its faculties, departments, centres and branches for the entire academic year, with a description and justification for each financial item (Ibid). Based on the allocated budget and other incomes such as donations, grant, projects and endowments, each university strives to improve the infrastructure and deploy the most appropriate available technologies in order to develop the educational level, the productivity and the performance of the different stakeholders. Moreover, they aim to increase the effectiveness of the decision-making by presenting precise and accurate data in a timely manner.

2.6.2 Technologies Implementation in Saudi Universities

According to the Ministry of Education Saudi Arabia (2015), the Saudi universities' context has been motivated by its huge budget and other revenues allocated to each university by adopting new technologies, such as the implementation of ERP systems in order to enhance the academic affairs, employment affairs and even the top management decision-making procedures, which can be seen by shifting the legacy systems to new automated systems. Currently, most universities have reached a developed stage for the implementation of ERP systems, while, the remaining universities, generally considered as newly established universities, consider the implementation of the ERP systems as a main concern to compete with the older universities as well as the new Vision 2030 of Saudi Arabia (Ibid). The huge budget and other sources of money available to each university, means the high cost of implementing such technology and new systems is not considered as an obstacle to the context of Saudi universities in the same way as it can be a problematic issue for other contexts, such as businesses and organisations context within the private sector. The following table (2.5) shows examples of several Saudi universities and their ERP systems' implementation:

Table 2.5: ERP Systems Implementation in Several Universities

University	Founded	ERP systems Provider	Applied	Description	Source
King Saud University (KSU)	1957	SAP Company and MADAR System	2010	Signed with SPA Company to become one of the members of the SAP University Alliance programme in order to improve and develop e-services and shift the legacy systems. Moreover, the university has developed a local ERP system known as the MADAR system to become the financial module for the university.	(King Saud University, 2011)
King Abdulaziz University (KAU)	1967	SAP Company	2011	Signed with SPA Company to supply its software, starting with the financial module, followed by the personnel module and a logistics system, covering contracts, procurement, planning, budgeting, monitoring, warehousing and inventory control	(King Abdulaziz University, 2012)
King Fahad University of Petroleum and Minerals (KFPM)	1963	SAP Company	2010	Signed with SPA Company to become one of the members of the SAP University Alliance programme in order to improve and develop e-services and shift the legacy systems.	(King Fahad University of Petroleum and Minerals, 2011)

Taibah University	2003	Oracle Company	2013	Signed with the Oracle Company in order to implement the Oracle Solutions for the financial module, followed by the personnel module and a logistics system, covering contracts, procurement, planning, budgeting, monitoring, warehousing and inventory control.	(Taibah University,2014)
AlJouf University	2005	Cisco Company	2012	Signed to apply Cisco WebEx enterprise collaboration solutions for secure e-learning and a number of other Cisco WebEx products, including its Meeting Centre, Event Centre, Training Centre and Support Centre. After that the university developed the systems to cover the other processes.	(AlJouf University, 2013)
University of Shaqra	2009	SPA Company	2013	Signed with the SPA Company to supply its software, starting with the financial module, followed by the personnel module and a logistics system, covering contracts, procurement, planning, budgeting, monitoring, warehousing and inventory control	(Shaqra University, 2014
The King Abdullah University of Science and	2009	SAP Company	2012	Signed to become a member of the SAP Alliance Programme and the university has implemented IT systems and an on-line project development tool in order to increase the outcome of scientific research for science and technology field.	(King Abdullah University of Science and Technology, 2013).

Source: Compiled by the researcher

2.6.2.1 SAP University Alliance (ERP systems Vendors)

As mentioned earlier, every university in the Kingdom has autonomy in certain aspects of the way the university is run. Therefore, it can be seen that universities have signed with different vendors, whether local or international, in order to implement the ERP systems. However, the most important and popular vendor for ERP systems in the universities' context is the System Analysis and Program Development Company (SAP) and its programme of SAP University Alliance (SAP Software Solutions, 2014). Regarding Saudi universities, several universities such as King Abdulaziz University, King Saud University, King Khaled University and University of Shagra, have joined the SAP University Alliance in order to improve the academics' performance and employment productivity by exploiting the long practical experience of the largest integrated ERP system, which is the SAP solutions programme of the University Alliance (Shaqra University, 2014).

Moreover, the SAP programme enhances the career prospects of students seeking for jobs. In addition, the company has produced many other services that can be used by the member universities such as utilizing an online environment that links the latest social media channels, providing different materials and sources that can be useful for academics and students worldwide, and enhancing the learning environment between academics and their students. Another advantage that can be useful for academics in particular, is that the SAP programme has linked the research and publications of academics worldwide, which can increase the output from each member in the programme to improve the quality and quantity of publications and research, and facilitating access for the university's academics and researchers to enhance their productivity in the research field (SAP News, 2013). Indeed, there are many other advantages that universities can gain by implementing the SAP Alliance Programme or other ERP systems; thus, awareness of the importance of such systems has the attention of the Higher Education Supreme Board and universities.

2.6.2.2 ERP Systems' Evaluation in Saudi Universities

Most of the Saudi universities have been established in the last decade, because of the huge evolution prompted by the previous ruler, King Abdullah Bin Abdulaziz. Therefore, most of the universities have only just implemented the ERP systems in their environment, which means that they are still in the maturing phase and have not yet have extended to the assessment stage. However, as discussed in the literature, it is essential that the evaluation phase for the ERP systems is established from the implementation phase as well as through all the further processes (Mehlinger, 2006). To date, there is no empirical evidence that can be reviewed regarding the evaluation phase, especially in relation to academics' performance while using the implemented ERP systems in their universities or even the performance of the implemented ERP system itself. While a few universities, such as King Fahad University of Petroleum and Minerals, have used an informal online survey to gauge the satisfaction levels with the provided Information Technology services of the universities, nevertheless, no formal and comprehensive assessment model or method has been implemented to study the factors that highly impact academics' performance while using the implemented ERP systems. In 2013, there was an attempt by Althonayan and Papazafeiropoulou to create a framework that integrated three widely used models in the field of Information

Systems and ERP systems in order to help researchers develop a model that could assess the different stakeholders' performances, and which has been adapted in the current study in order to empirically investigate and highlight the current gaps. Moreover, the current study proposes a general model that covers the factors that significantly impact on academics' performance while using the ERP systems in the Saudi universities' context. Therefore, the following sections discuss the findings of the collected quantitative and qualitative data and relate it to previous published studies in the literature.

2.7 Summary

This chapter has emphasised several characteristics regarding the context of the current study. Explaining the cultural, social, political and economic environment in the kingdom is beneficial to understand the importance of this study for the current context. This is because there is no doubt of the influence that can be exerted by the environmental factors of each country which may impact, whether positively or negatively, on the implementation, post-implementation and end-users evaluation phase of each Information Systems/ERP systems' adoption by the different sectors. The fast development of the CIT sector in the Gulf region, particularly in Saudi Arabia, and the strong economic factors, led the government to implement e-portal in order to speed its services for the society and to increase efficiency.

Other characteristics such as culture, climate and politics have played important roles as well in shaping the adoption of e-services in the kingdom. In addition, this chapter has highlighted the economic situation of the kingdom as well as the Saudi Vision 2030 that has been produced by the Council of Economic and Development Affairs in order to face the challenges and difficulties that have been caused by the decline in oil prices, which is the major revenue for the kingdom. Finally, the current chapter has highlighted Higher Education mission objectives and achievements and its important role in achieving the Saudi Vision 2030 as well as the vital role of academics in improving the outcomes of universities in ways that satisfy the market place with highly skilled manpower.

CHAPTER THREE: LITERATURE REVIEW

3.1 Introduction

This chapter aims to critically review the literature related to Enterprise Resource Planning (ERP) systems in line with the research objectives of this study. It will position this study within the broad debate of ERP by focusing on academics within the universities context in Saudi Arabia. This study aims to fill the gaps in the literature by formulating a conceptual framework demonstrating the factors that significantly impact academics' performance and productivity while using ERP within universities context. Firstly, the literature review provides a critical overview of ERP systems in general by evaluating their progress, their importance and the reasons for implementing them. Next, it assesses the success rate of ERP systems with stakeholders using Information Systems and ERP systems. The focus then turns to ERP in the universities' context and how such systems can be operated in an academic environment. Finally, there is an overview of previous works on ERP systems in the Kingdom of Saudi Arabia (KSA). This review identifies the gaps in the literature concerning the impact of ERP systems on academic staff's performance, which is a central concern of the present study.

The purpose of reviewing the extant ERP literature is to synthesise, compare and contrast the different theories and models and establish the theoretical foundations. Reviewing and evaluating the ERP literature is pertinent in order to contextualise and position the current research, identifying actual gaps and clarify how ERP has already been investigated in various contexts and across many countries, benefitting from previous researchers' experiences and findings. The purpose of the present literature review is to provide a broad overview of current thinking in relation to the theoretical ERP models, approaches, human capital drivers as well as the key drivers and challenges for developing and managing ERP in general, and the extent to which this pool of information about ERP can benefit the universities in Saudi Arabia. This provides an evidence base and a strong platform for supporting and developing ERP systems in the universities' context.

In order to address the objectives of this research, several headings have been highlighted from the existing literature. Those headings are: ERP systems in general, ERP systems in the public sector worldwide, ERP systems in the universities' context worldwide, Information Systems and ERP systems' performance measurement, evaluation of ERP and Information System performance in general, and finally, ERP systems in Saudi Arabia.

ERP systems are one of the most commonly accepted adoptions to obtain competitive advantage and to improve organisational functional efficiency and effectiveness through the continuous integration of all information flowing through the organisation. Internal enhancement is one of the tools that the private and public sector or organisations are interested in to raise the efficiency in the entire process and procedure. Despite the important effect of ERP systems on private and public sector functions, the implementation of such systems is considered as complex and costly. Therefore, the phase of evaluating the post-implementation of the ERP systems has become essential from the stakeholders' perspective, as much as considering the technical perspective on ERP systems. This chapter proposes a critical analysis of relevant keywords, which have been identified from the existing literature: ERP systems in general, evaluation, performance, stakeholders, and ERP systems in universities. Those areas will be pursued to identify the position for the present research among the previous works and studies, particularly within the ERP systems in the universities' context.

3.2 ERP Systems in General

ERP systems are defined as software that has been increasingly implemented by various organisations in different sectors, such as public and private, in developed and developing countries (Parveen and Maimani, 2014). Almashari (2002) mentioned different definitions by various authors in the 90s, Gable (1998, p. 3), who defined ERP systems as a "*comprehensive packaged software solution seeking to integrate the complete range of business processes and functions in order to present a holistic view of the business from single information and IT architecture"*. This definition slightly contrasts from that of Rosemann and Wiese (1999, p. 773) who defined ERP systems as *"customisable, standard application software which includes integrated business solutions for the core processes (production planning and control) and the main administrative functions (human resources, sales and accounting) of an enterprise"*. In this century, ERP systems have expanded and are used in many areas by researchers, which has led to the appearance of new definitions by authors such as Zhu et al. (2010, p. 265) who defined ERP systems as *"configurable information systems packages that integrate information and information-based processes within and across functional areas in an organisation"*. In other words, one of the most important phases of current ERP systems' use is that it is much more than manufacturing resource planning, having become popular with non-manufacturing operations in service organisations such as universities, hospitals and airlines (McGaughey and Gunasekaran, 2009). According to Calisir and Calisir (2004), the essential ERP architecture is built upon one database, one application and a standard interface across the entire enterprise. On the other hand, San (2005) defined ERP systems as multi-module application software packages that serve and support multiple business functions.

ERP systems and their software packages have been implemented and used by researchers in different fields, especially for research in Management Information Systems (MIS), which can have wide organisational effects, rather than localised individual and group task-level effects (Shehab et al., 2004). Therefore, ERP systems have been in high demand to be used in both industrial and services organisations, because ERP provides a strongly integrated solution to any organisation's information system requirements (Nizamani et al., 2014). Thus, ERP systems have become ubiquitous, as indicated by a growth in ERP software licence revenue of 19% in 2007 (Strong and Volkoff, 2010). However, they mentioned that packaged software raises important theoretical issues associated with the fact that, by definition, it is designed to meet generic rather than specific requirements, making it unlikely to be a perfect fit in any particular instance (Ibid).

Based on the above discussion, ERP systems have been in high demand within either manufacturing or other organisations such as services provider organisations, in order to adopt integrated solution to an organisation's information system's needs. Moreover, ERP systems have come under consideration by scholars and researchers in different fields of studies. Information System practitioners and experts have given ERP systems substantial consideration. Therefore, over the last decade, the ERP market has become one of the most important markets and investments in the worldwide Information Systems and Information Technology field (Shehab et al., 2004).

3.2.1 The Development of ERP Systems

Enterprise resource planning systems have been developed to support and automate business processes and redefine the potential of enterprises, regardless of their size and industry (Wei and Wang, 2004; Chand et al., 2005; Esteves, 2009). In the early 1990s, several business organisations began to realise the significance and need for a shared organisation-wide platform for interaction, communication and integration between business divisions (Allen and Kern, 2001; Wagner and

Newell, 2006). However, based on the Material Requirement Planning (MRP) and Manufacturing Resource Planning (MRP II) systems, ERP systems superseding the previous two systems mentioned, surfaced as one of the foremost vital developments in the corporate use of IT (Almashari et al., 2003; Somers and Nelson, 2004; Perera and Costa, 2008). Literature has clearly shown that current ERP systems have grown from both MRP systems and MRPII systems. This evolution from MRP to ERP was due to several weaknesses in MRPII systems in managing a production facility's orders, production plans and inventories. Moreover, there was a need to integrate new techniques that led together to the development of a rather more integrated ERP solution (Chung and Snyder, 2000). Bajwa et al. (2004) stated that scholars have reported that ERP facilitates the automation of core business processes, and establishes links with stakeholders including suppliers, customers and end-users to integrate horizontal and vertical value chains of an organisation. Therefore, ERP systems are developing constantly and currently they mainly include all integrated Information Systems that can be used across any organisation (Kumar et al., 2003). Despite the significance of ERP systems in organisations, adopting and implementing these systems are complex exercises as the way organisations conduct their businesses is not standard (Markus and Tanis, 2000; Basoglu et al., 2007). The following table (3.1) summarises the history of ERP systems' evolution:

Table 3.1: The Historical Development of ERP

System	Primary Business Need(s)	Scope	Enabling Technology
MRP	Efficiency	Inventory management and production planning and control.	Mainframe computers, batch processing, traditional file systems.
MRP11	Efficiency, effectiveness and integration of manufacturing systems	Extending to the entire manufacturing firm (becoming cross-functional)	Mainframe and mini computers, real-time (time sharing) processing, database management systems (relational)
ERP	Efficiency (primarily back office), effectiveness and integration of all organisational systems.	Entire organisation (increasingly cross-functional), including manufacturing operations	Mainframe, mini and macro computers, mainframe networks with distributed processing and databases, data warehousing and mining knowledge management
	Efficiency, effectiveness and	Entire organisation extending to other	Mainframes, client server systems, distributed

ERP11	integration within and among enterprises.	organisations (cross-function and cross-enterprise – partners and suppliers	computing, knowledge management, internet technology (includes web service, intranets and extranets)
IRP, Enterprise system, Enterprise Suite, or whatever label gains common acceptance	Efficiency, effectiveness and integration within and among all relevant constituents (business and government, consumers) on a global scale.	Entire organisation and its constituents (increasingly global) comprising supply chain from beginning to end, as well as other industry and government constituents)	Internet, web service architecture, wireless networking, mobile, knowledge management, grid computing, artificial intelligence.

Source: (McGaughey and Gunasegaram, 2007).

Notwithstanding the possible advantages of ERP systems, however, they are considered as costly, complex and difficult to be implemented. Nevertheless, many organisations have found numerous reasons to implement ERP systems and challenge the possible threats (McGaughey and Gunasegaram, 2007). The following subsection reviews the potential advantages of ERP systems that encourage organisations to implement such a system.

3.2.2 Potential Advantages of ERP Systems

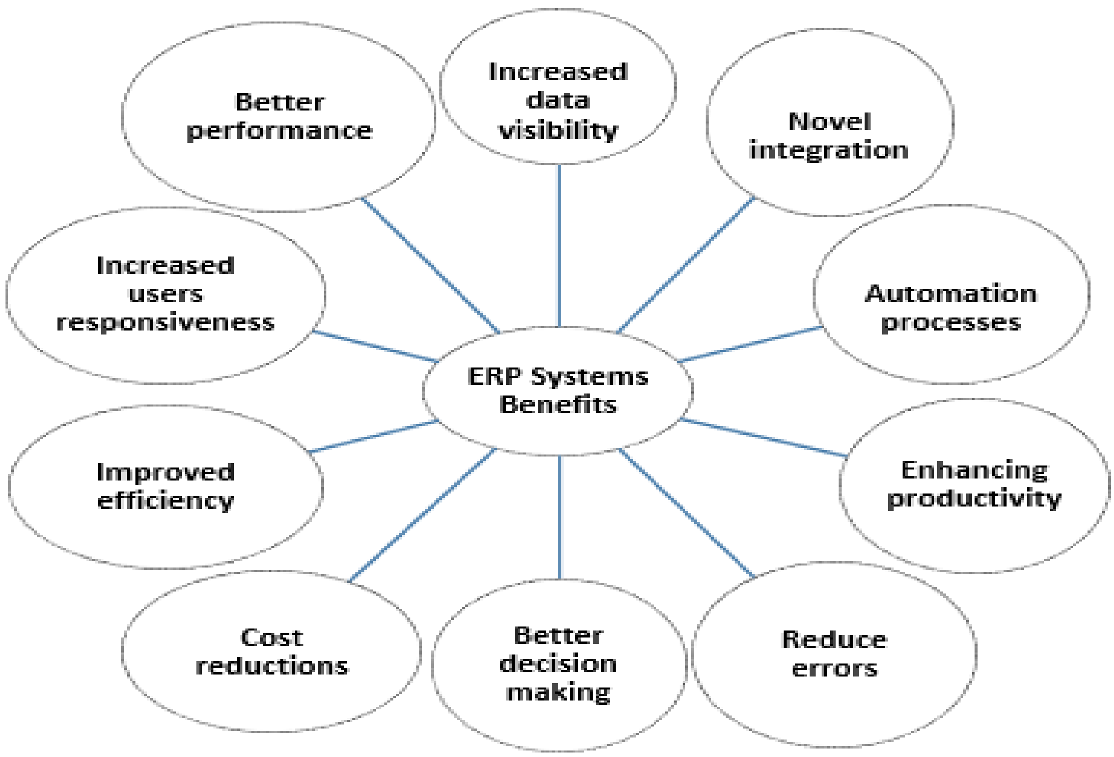
ERP systems play a significant role in public and private organisations; however, in order to understand this, individuals in the organisations are required to have an overall clear understanding of the key features of ERP systems functions that may be produced by any organisational structure. Thus, ERP systems are considered as extensive, integrated software systems that support IT infrastructure, business process and other internal operations of an organisation (Doom et al., 2010).

Justification to adopt ERP systems has primarily been the considerable benefits that the organisations aspire to obtain, or to support the organisation's business structure (Nguyen, 2009). ERP systems' adoption and implementation is not just narrowed to one department; it is an organisation wide issue and can be perceived as a modernisation and automation project, strategic change, an organisational system, software, business process improvement technique, or an IT integration of the firm (Macpherson et al., 2003). These different categories demonstrate different perspectives for ERP systems' adoption within an organisational structure such as stakeholders, business processes, and technology and IT infrastructure. ERP systems provide different kinds of benefits to an organisation. These benefits include cost reduction, cycle time reduction, building cost leadership, operational control, reduced inventories, better data analysis, empowering employees (Shang and Seddon, 2000; Abdelghaffar and Azim, 2010).

Elmes et al. (2005) clarified that there are many differences between the legacy systems and ERP systems. These differences have led to the replacement of the old system by the ERP systems in several organisations. Indeed, reasons behind taking a decision to adopt and purchase such systems were expected enhanced information capture and increased transparency and better information flow.

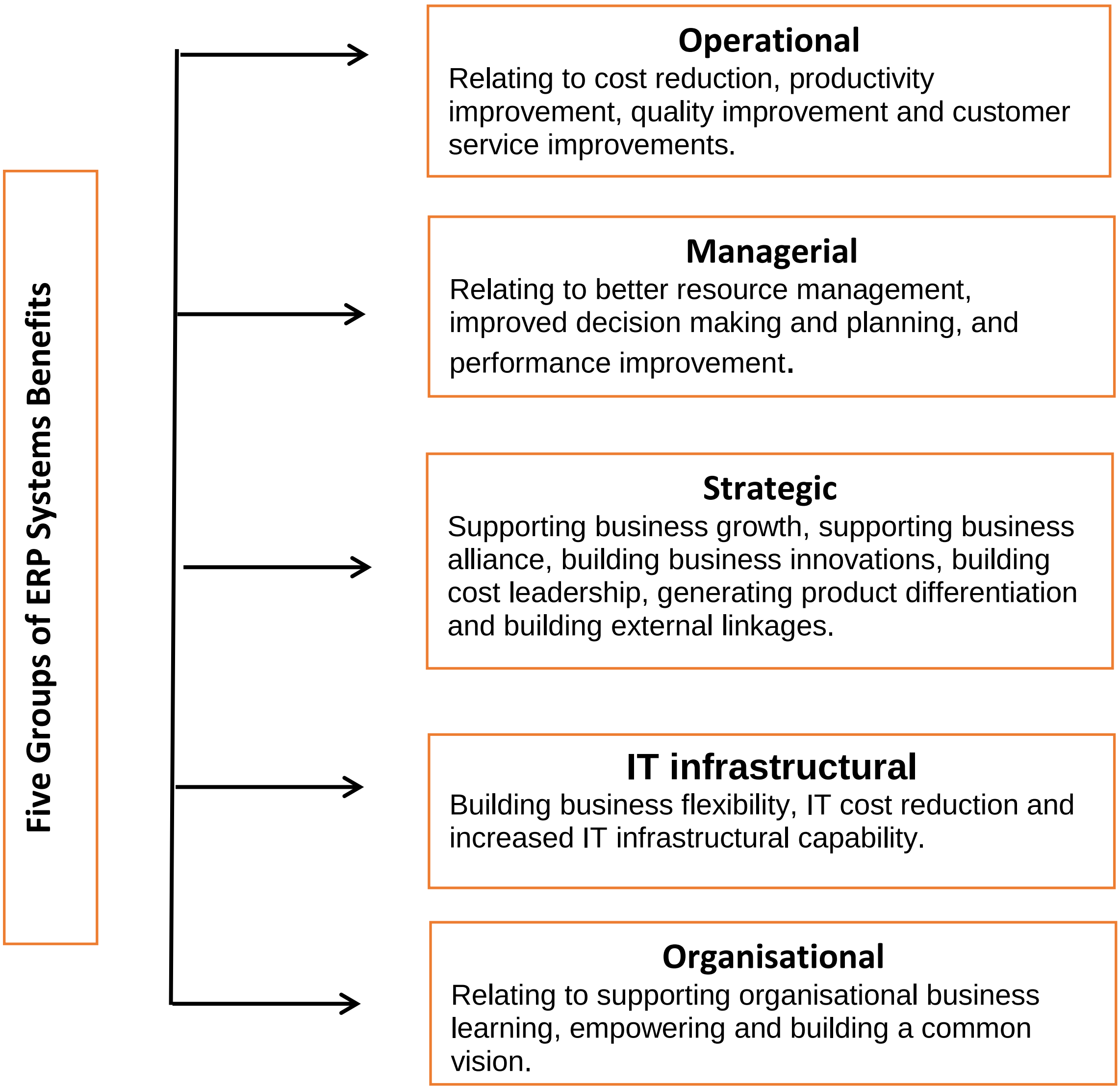
Many authors (such as Nah and Delgado 2006; Shehab et al., 2004; Elmes et al., 2005) have listed the most important points of ERP systems and their ability to improve organisational effectiveness and efficacy. Some of the important points of ERP systems are as follow: Firstly, enhancing productivity by using the ability to implement all variations of best business practice with a view to reducing errors which occur by sharing of common data and practice across the whole enterprise. Secondly, improving decision-making and cost reductions by accessing information in a real-time environment and improving performance and data visibility. Thirdly, increasing user responsiveness. Finally, providing a unique integration of management and an IT concept. The following figure (3.1) summarises the main benefits of ERP systems:

Figure 3.1: A Summary of ERP Systems Benefits



Moreover, there are different benefits of implementing ERP system, which have been mentioned by Bhamangol et al. (2011). Those benefits include: improving access to accurate and timely information; providing user-friendly web-based interfaces; establishing a foundation for new systems and integrating existing systems; ERP systems create a single version of the truth because everyone uses the same system; knowledge sharing; individual data security; and finally interaction and collaboration with third parties for business. Shang and Seddon (2000) have written another classification of the benefits of ERP systems implementation as shown in the following figure (3.2).

Figure 3.2: The Benefits of ERP Systems' Implementation



Source: (Shang and Seddon, 2000)

3.2.3 Failure of ERP Systems

In spite of the efforts put into planning, selection and spending of financial resources, many projects do not reach a successful conclusion as it has been shown in the past that many ERP systems projects have failed to keep up to their pledged performances. Hence, the historical results of poor success rate makes managers wary of the new system implementation (Acar et al., 2005; Shin, 2006). Therefore, it is important to highlight the challenges faced in the implementation of ERP systems.

Despite the important benefits mentioned in the previous subsection, ERP systems are extremely expensive with costs reaching several million dollars. Therefore, cost is the first point that was listed by Markus and Tanis (2000), when they declared that ERP implementation is an important and challenging decision for organisations, which can cause potential failure in reference to: financial issues; managerial issues; IT adoption issues; technical issues. The next table (3.2) shows the potential failures in implementing ERP systems:

Table 3.2: Potential Failures in Implementing ERP Systems

Financial Issues	Managerial Issues	IT Adoption Issues	Technical Issues
Installing an ERP system is an expensive and risky project.	ERP projects are managerially challenging, since they may involve parties from many different organisations and cut across organisational political structures. Furthermore, ERP has important implications for how companies should organise and manage their IS functions.	ERP systems have been widely adopted across organisations and have large potential impacts at all levels of analysis, such as individual and social, work system, organisational and inter-organisational.	ERP systems are technically challenging; therefore, the most important technical area of research around ERP is ‘development and reference models’.

Source: (Markus and Tanis, 2000)

Additionally, Beretta (2002) has added another potential cause of failure in implementing ERP systems, which is the integration issue. Beretta has clearly stated that in order to implement effective ERP systems, integration has to be leveraged along three dimensions as shown in the following table (3.3):

Table 3.3: The Three Dimensions of Integration		
Information integration	**Cognitive integration**	**Managerial integration**
One dimension of integration has to do with the ability to transfer information efficiently throughout the organisation through data and objects; the connection of the information generated in different parts of the organisation is a basic component of its integration capabilities.	Effective integration requires that the different perspectives related to the various professional realms involved in the process are matched; so that each professional in the process is matched (i.e. each professional should understand the points of view of other professionals). This does not mean that any perspective has to be accepted uncritically. The point is that in functional organisations, the simple understanding of different needs is quite often made difficult by the cognitive filters that permeate the borders of functional units. Reciprocal understanding may help each manager to take into consideration solutions that can be mutually satisfactory.	The personal commitment of each manager must be affected. The nature and relevance of the economic responsibilities assigned to managers and of the connected incentive systems play a significant role in enabling or opposing organisational integration.

Source: (Beretta, 2002).

Bakry and Bakry (2005) suggested that the purpose of an ERP system is to automate the business processes of an enterprise in order to support e-services' implementation and to provide better performance. McGaughey and Gunasekaran (2009) noted that organisations nowadays seem more focused on external aspects, as they look for ways to support and improve the relationships and the integration between the related stakeholders such as customers, suppliers and partners.

Briefly, the ERP systems have very strong conceptual relations with all Information Systems major areas of research. Therefore, researchers have to consider the importance of the evaluation phase for the new technologies' implementation and post-implementation in terms of the technical, financial and human aspects (Marler et al., 2009; Stone et al., 2015; Johnson et al., 2016). Thus, the following section discusses several published works regarding the evaluation of Information Systems in general, as well as the different aspects of evaluation.

3.3 Evaluation of Information Systems

Despite the importance of the evaluation phase as a critical process for the successful implementation of Information Systems, it is an area where not enough attention has been given to it by researchers and scholars. Scholars who have investigated the evaluation of Information Systems include Serafeimidis and Smithson, 2000; Irani, 2002; Love and Irani, 2004; Stockdale and Standing, 2006; Ayora et al., 2015.

As a starting point, the literature shows that administrators and Information Systems experts have identified the phase of Information Technology evaluation under the Information Systems concerns. Thus, it is difficult to evaluate the Information Systems in an organisation because this requires a clear, documented, systematic, analytical and formal approach (Jones, 2008). Considering their purpose, significance and contribution is essential and understanding the context in which the evaluation takes place is a first step (Farbey et al., 1993).

According to Stockdale et al. (2008), the main purpose of the evaluation phase is to demonstrate the value of the systems and investigate the success or explain the benefits of the implemented systems. On the other hand, Farbey et al. (1992) argue that the role of the evaluation depends on the time and the level at which it is accepted. Consequently, the different terms of evaluation schemes such as appraisal, measurement and assessment are consistent concepts. The only difference between the terms evaluation and appraisal according to Farbey et al. (1999), is evaluation can be explained as a term that sometimes refers to an event taking place at the commencement of a project and is often used imprecisely in order to decide whether it should proceed or not and is usually reserved for a post-implementation review of benefits achieved. The term appraisal tends to refer to a decision point. In the literature, the term and the concept of evaluation have been used more widely than the term of appraisal.

According to Farbey et al. (1999, p. 190), evaluation can be defined as "*A process, or group of parallel processes, which take place at different points in time or continuously, for searching and for making explicit, quantitatively or qualitatively, all the impacts of an IT project and the programme and strategy of which it is a part*". Irani and Love (2008) adopted the previous definition and provided a basic version of the same definition. Alyassen et al. (2008) stated that the importance of the evaluation phase is to track the direction of the Information Systems project. Based on the definition of Farbey et al. (1999) given above, financial and other quantitative and qualitative evaluations - in other words predictive evaluations - are only executed to forecast the effect of a project and provide support and justification for the investment by forecasting project baseline indicators such as payback, net present value or internal rate of return. On the other hand, based on Alyassen et al.'s (2008) view, 'formative evaluation' guides a project to important alternatives, which leads to significant changes in the structure of the systems as well as the functions and the operations of the systems.

However, formative evaluation does not provide any reaction outside the design, the implementation and the delivery of the project outcome. Therefore, Alyassen et al. (2008) have taken under their consideration the effectiveness in term of Information Systems evaluation. The effectiveness evaluation has an important and a real effect on the information more than the estimated information and data. Moreover, it can be applied to justify many advantages such as: implementation; to estimate the direct cost of Information Systems; to estimate its tangible benefits; to ensure that it meets requirements; to measure its effectiveness and efficiency; and finally to measure the quality of the system. In fact, Alyassen et al. (2008) stated that the effectiveness evaluation has to be implemented throughout the operational stage of a project, which tends to refer to post-implementation evaluation. The following table (3.4) explains the different forms of Information Systems evaluation:

Table 3.4: Information Systems Evaluation Forms

Evaluation Form	Description
Predictive Evaluation	Performed to forecast the effect of the project and provide support. Examples, payback, net present value or internal rate of return
Formative Evaluation	Guides and directs the project to important alternatives, which lead to significant changes in the structure of the systems as well as the functions and the operations of the systems.
Effectiveness Evaluation	Has important and real effect on the information more than the estimated information and data. It can be applied to justify many advantages: -Implementation processes. -Estimate the direct cost of IS. -Estimate its tangible benefits. -Ensure that it meets requirements. -Measure its effectiveness and efficiency. -Measure the quality of programs.

Source: (Alyassen et al., 2008)

Based on the above definitions and the different Information Systems evaluation forms, the next stage discusses the different kind of aspects related to the

Information Systems that can be evaluated. According to Adelakun and Jennex (2002), Information Systems evaluation approaches can be classified into four main and most dominant aspects; financial, functional, strategic measure, and subjective measure. The following table (3.5) explains the different approaches with their specification:

Table 3.5: Information Systems Evaluation Approaches	
Approaches	**Specification**
Financial	This approach usually focuses on money and quantification, which is dealing with statistics and numbers only.
Functional	The main aim of this approach is to assess the difficulty that can be faced by systems during the development process, Moreover, it determines a cost per unit of complexity. For instance, technical stakeholders regularly use this model to assess system development projects.
Strategic Measure	This approach is always based on the position that a strategic Information System is necessary and thus, must be developed.
Subjective Measure	This approach usually highlights and emphasises the value that can be added by Information Systems.

Source: (Adelakun and Jennex, 2002)

As has been mentioned, the above approaches are widely dominant. However, Farbey et al. (1993) stated that there are other approaches, which can be applied in order to evaluate Information Systems such as cost-benefit analysis, return on management (ROM), return on investment (ROI), and information economics. Additionally, in order to perform the processes phase successfully, they have listed several techniques (Ibid). These techniques are: (i) multi-objective, multi-criteria methods, which can be used and are often regarded as alternatives to cost-benefit analysis; (ii) value analysis, experimental methods: this can be considered as another way of attempting to create a value for the outcome of the system, the method highlights benefits rather than cost, and it can be used primarily for evaluating concepts such as ‘better information’; (iii) composite ad hoc methods: numerous corporations combine parts of a number of methods and vary the methods to suit the situation, often using short-cuts or approaches they have developed themselves; finally, measuring the functional performance of systems is a method followed by Saunders and Lewis (2012), who defined ‘systems’ as all groups and departments within the organisation.

In the study by Saunders and Jones (1992), some aspects have been highlighted and suggested in terms of their needs, for instance: the impact of the aspect on strategic direction; the integration of Information Systems function planning with corporate planning; the quality of information outputs; and finally the influence of the aspect on an organisational financial performance. Moreover, Saunders and Lewis (2012) stated that as much as the Information Systems functions are accurate, as they mature, the measurement aims change from operational efficiency and user satisfaction to a more unstructured concern for its impact on strategic direction. Indeed the previous aspects can be used in Information Systems evaluation formally or informally for different criteria such as financially, technically, and socially as well as following strict methodologies, Moreover, they can frequently become a political tool that affects the stability of organisational power and encourages organisational change (Serafeimidis and Smithson, 2003). To make it clearer, formal evaluation practices have to be stimulated by organisational rules and structures, while informal evaluation practices have to be employed by the stakeholders who are involved, and finally academics' recommendations, which in many cases identify the suitable nature of evaluation but have nevertheless not been used in practice. Irani et al. (2002) have a different view based on a project's relative dimensions. Their vision categorises four main levels of evaluation: strategic, tactical, operational and financial. Three years later, Irani et al. (2005a) proposed a framework, which divided the information technology investment into five aspects; each aspect has its own set of objectives, goals, and expectations. The following table (3.6) shows clearly the five proposed aspects.

Table 3.6: Five Aspects of Information Technology Investment

Aspects	Specification
Managers	The first aspect involves the managers of the organisation and their interest in increasing the financial and other investments that have been produced by the organisation. Moreover, they attempt to guarantee that the project is implemented on time, within budget and according to user requirements.
Users' requirements	The second aspect, which is users' requirements, must be met by the technology while integrating flexibility to modify according to the changing requirements of users/ customers.
Project team members	Project team members can be defined as the implementers who are aiming at short-term standards set by sponsors. These sponsors review and judge their performance.
Supporters	Supporters may also be called subcontractors. Indeed, they are aiming at short-term standards and criteria only.
Stakeholders	This aspect involves a set of different groups, each group has its own aims and objectives. They could support the investment positively or negatively through the form of resistance.

Source: (Irani et al., 2005a).

The study by Jones (2008) suggests that the most considerable methods lie with the financial cost and benefits as the mechanistic approach are the formal Information Systems evaluation. While, Farbey (1992) confirmed that each evaluation method has its own features and emphasis. As an example, Return of

Investments method focuses on evaluating the present value of predictable future cash on the assumption that future benefits are subject to some discount factor.

According to Jones (2008), giving authority to top management and the decision makers in order to compare the estimated returns on the different investments are considered as the essential strength of the Return of Investment method. On the other hand, the method’s weakness is that some good investment possibilities are withheld because the benefits are difficult to assess in cash flow terms. Other examples of evaluation methods are Cost Benefits Analysis (CBA) and Multi-objective or Multi-criteria (MOMC). CBA works to attempts to find a financial value for each element contributing to the costs and benefits of a development project, but the MOMC approach is based on the assumption that the value of a project can be measured in terms other than money. In fact, according to Farbey (1992), recommendations that have been provided by CBA are often denied by decision makers who cannot accept the values assigned by predictors and cannot accept the artificiality of some of the substitute procedures that have been suggested by the CBA method. So, that can be considered as the core weakness of CBA, while the MOMC approach permits decision makers to assess the relative value of different results in terms of their own preferences, Moreover, the MOMC allows the decision makers to rank goals by applying a preference weight to each result (Ibid).

Return on Management is considered as an advanced method, which can be defined as the value attributed to the information system as a gradual change to the level of the existing management productivity. Value analysis attempts to evaluate a wide range of benefits, including intangibles. However, the use of experimental methods is a recent development in the context of project evaluation (Charness et al., 2013).

According to Farbey et al. (1999), information economics is one of the methods, which depends on quantitative assessment of costs, benefits and risks. Additionally, approaches such as ‘softer’ methods, MOMC methods, and systems dynamics models, which are based on modelling and experiment, can identify and assess benefits.

Briefly, the existing and most widely used Information Systems evaluation methods are mainly focused on financial, economic, and technical factors. Thus, this is one of the weaknesses of using such methods in the public sector in general. The reason behind this is the complication in defining the productivity, cost-saving and value in the non-profit sector in which their responsibility mostly is to assist and serve the society and the public (Jones, 2008; Venable et al., 2012; Peffers et al., 2012; Pare et al., 2015).

Several scholars have declared that the term evaluation is difficult to apply in the Information System field because of the shortage of Information Systems evaluation methods that can be implemented in the public sector. Land (2001) argued that the main problematic issues are forecasting Information Systems such as cost, risk, benefits, impact and lifespan, while Myers (1997) stated that Information Systems managers are always under pressure to explain the influence of Information Systems costs on the productivity, quality and competitiveness of the organisation. Therefore, Information Systems evaluation is important to provide the feedback needed for effective management and to increase the improvement of the Information Systems functions and processes (Dwivedi et al., 2015).

In the public sector, the preferred and most suitable approaches and methodologies regarding Information Systems evaluation have little agreement in the literature (Land, 2001). Jones (2008) and Lee-Rhodes et al. (2012) agree there are few methods and models, which have been developed in order to evaluate and assess the efficiency and effectiveness of Information Systems in the private or the public sector. Land (2001), however, highlighted fifty approaches and methods from the literature to help the evaluation process of Information Systems. According to Stockdale et al. (2008), the main challenge that can be faced in Information Systems evaluation is to develop a framework that is adequately generic to have the applicability and the validity for an extensive range of circumstances and conditions. Moreover, the frameworks have to be sufficiently detailed to provide actual direction (Heo and Han, 2003).

According to Agourram and Ingham (2007), there are several factors that cause problematic issues in the process of evaluation of Information Systems. These factors are the combination of technical and social aspects and the integration of business practices and Information Systems, which make the identification of their individual contributions to success more difficult and problematic. Finally, some scholars such as Rogers (2002) and Patton (2008) stated that the methodological aspects of Information Systems evaluation is considered as the main issue. In contrast, several scholars have contended that most Information Systems are considered as social systems, thus, the significance of the social aspects are noteworthy (Checkland, 1981; Walsham, 1993; Walsham, 1995; Introna, 1997;

Hirschheim and Smithson, 1999; Avison and Elliot, 2006). Similarly, some authors have also stated that the evaluation of Information Systems can be enhanced by implementing a method based on reading and understanding the social and the organisational aspects of Information Systems (Hirschheim and Smithson, 1999; Serafeimidis and Smithson, 2000; Irani et al., 2005b; Spekle and Verbeeten, 2014).

Based on the previous statement, Serafeimidis and Smithson (2003) have provided a compatible explanatory approach based on the idea of the stakeholders' perspective in order to understand the Information Systems. Peter and Irani (2004) agreed with the study of Serafeimidis and Smithson (2003) and they confirmed the importance of taking into account the different stakeholders and their perceptions, as well as a multi-layered Information Systems evaluation. In other words, little consideration of the administrative context in which assessment is combined such as the system's development lifecycle, the Information Systems management practices and procedures, compounded with an inadequate understanding of stakeholders' behaviour, would lead to the creation of a gap between theory and practice (Althonyan, 2013). Therefore, most problems are located in the very nature of the prevailing Information Systems, such as using prescriptive evaluation strategies and disregarding the important human and organisational implications of developing an infrastructure (Irani, 1998).

However, the human and organisational implications of developing an infrastructure are unique to each organisation, so the most suitable investigative methodology for each corporate or company needs to be accurately identified. The previous step leads to the detection of criteria for making investment decisions in order to create a model that can be used as a frame of reference by others (Althonyan, 2013).

If the Information Systems are treated as a technical problem only, this can lead to worthless deductions and assumptions, which indeed overlook the social activity inherent in the evaluation process and ignore the socio-political environment of an organisation (Stockdale et al., 2008). Most of the related benefits that can be gained from the adoption of Information Systems tend to be qualitative and often intangible. So, based on that, the evaluation processes have to be expanded so as not only to predict the cost and financial aspect as there are many advantages of the evaluation to be considered, such as the benefits that could be received by the analysis of the presented opportunities founded by Information Systems.

According to Alyassen et al. (2008), the positivist scientific model, considered as a traditional conception, has investigated most of the Information Systems evaluation studies. That kind of concept views the evaluation as an external judgment of Information Systems; moreover, the evaluation isolates the human aspects, which leads to the placing of huge emphasis on the technological and financial aspects and disregards the organisational and social aspects. Based on the literature, proposing the process to perform evaluation has the most attention of researchers and scholars whereas understanding and analysing the role, relations, effects and organisational impacts of evaluation are neglected (Fryer et al., 2009; Willcocks, 2013; Spekle and Verbeeten, 2014; Galliers and Leidner, 2014).

Farbey et al. (1993) stated that in order to assimilate the evaluation phase into Information Systems, a suitable method needs to be deployed for the organisation's context. However, it is difficult and complex to find one assessment technique that has the ability to address all project concerns, and the reason behind that is related to the differences in the Information Systems strategic investments (Irani, 1998). That view is supported by Khalifa et al. (2001) who agrees that there is no appropriate method that can be deployed to evaluate all circumstances in the information Systems and Information field. Based on the above discussion, the use of the evaluation technique is widespread but there is no single evaluation method that can be applied to all the possible variations in one Information Systems project.

To conclude, this section of the literature clearly shows that the financial and technical aspect of Information Systems evaluation have the majority of the attention by researchers and scholars of the field, while the social and human aspects have been neglected and abandoned. The next subsection debates the evaluation of the ERP systems in particular, as well as different aspects of ERP evaluation.

3.3.1 Evaluation of ERP Systems

As mentioned earlier in the current chapter, Enterprise Resource Planning systems are considered as a compound and comprehensive software intended to integrate business functionality processes together in one users' interface. Notwithstanding the obstacles and barriers that could face the implementation of ERP systems in any business, the demand for such software technology is growing widely (Pan et al., 2007; Koslowski and Struker, 2011). Thus, scholars in the Information Systems field have set out to develop a suitable approach in order to assess ERP systems from different viewpoints. Two methods have been widely used by researchers in order to evaluate ERP systems. The first method evaluates the ERP systems through the financial performance of the business or the organisation, while the most preferred method used examines the ERP systems' critical factors in order to assess the technical efficiency and the continuous development in ERP systems by using the data envelopment analysis approach (Chen and Lin, 2008). Chand et al. (2005), provided a framework that has been grounded on the Balanced Scorecard (BSC) method in order to appraise the strategic performance of ERP systems. A year after the previous study by Chand et al. (2005), another perspective, which is the organisational performance, was investigated by Wieder et al. (2006); they highlighted the impact of the ERP systems on the business process performance by implementing an Information Technology measure. Since then, the need to identify and integrate the important metrics for the evaluation of ERP systems post-implementation has become necessary; therefore, a strong methodology has been developed by Argyropoulou et al. (2008) called the six imperatives framework. Moreover, they have confirmed that the above-mentioned methods/approaches can be used to assess the ERP systems performance. However, such techniques rarely give any consideration to certain aspects such as training and the user knowledge related to ERP systems and which can affect the performance of the users.

Certainly, financial and technical methods/approaches have the most attention by authors in order to evaluate the Information Systems as discussed in the last section. In the case of ERP systems, there are several methods/approaches, including financial analysis that have been practically applied to evaluate the ERP systems' performance as well as those methods, which have been used concurrently to evaluate the Information Systems (Wei, 2008). Nevertheless, there is a disregard of other important specific factors and aspects such as the effect of the system quality on the organisation and individuals that are considered problematic issues (Beretta, 2002).

According to Wei (2008), there is an alternative way to measure the output and the productivity of Information Systems or ERP systems, which has been developed based on the terms of Critical Success Factors (CSFs) that include three areas: technical, effectiveness and users' experience. Moreover, the quality evaluation of Information Systems looks at the performance characteristics of the evaluated system and its information quality and data. Thus, unlimited potential has been placed on the information quality evaluation of Information Systems. According to Wei (2008), information quality reflects some factors of the Information Systems such as accuracy, timeliness and content. Therefore, scholars have attempted to develop the aspects that lead to a great quality Information System that has a positive impact on the organisation. Despite the advantages of the CSF method to evaluate the ERP systems and the Information Systems, the CSF however still cannot ensure and provide understandable feedback on the assessment. This is because, as Sakris and Sundarraj (2000) point out, strategic systems have to be assessed on strategic metrics that are linked to the organisation's strategy, and in their study, they have stated the differences between the operational and financial evaluation that could be deployed in an organisation. Moreover, Al-Mashari et al. (2003) out forward some significant issues that lead to successful ERP systems projects. These issues are correspondence success, process success, interaction success, and expectation success. The following table (3.7) explains the four matters that lead to a successful implementation of ERP systems projects.

Table 3.7: Issues that lead to a Successful ERP Systems Project Implementation

Matters	Explanation
Correspondence Success	This matter could be defined as where there is a match between the ERP system and the specified objectives of implementation.
Process Success	Process success defined as when the system is implemented within specified time and budget.
Interaction Success	When users' attitudes toward ERP are positive and necessary.
Expectation Success	When the ERP systems matches users' expectations and requirements.

Source : (Al-Mashari et al., 2003).

The following section in this chapter focuses on three main points: performance measures of Information Systems, how they have been investigated and the most common perspectives that the researchers have focused on.

3.4 Information Systems and ERP Performance Measurement

During the last three decades, the performance concept has been used in different disciplines and fields of science such as performance management, appraisal, assessment and evaluation, which have been used as synonyms. Lansbury (1988, p. 46) presents a broad definition of performance management as *"The process of identifying, evaluating and developing organisational goals and objectives and ensuring they are effectively achieved, while at the same time benefitting employees in terms of recognition, receiving feedback, catering for work needs and offering career guidance".*

According to Beretta (2002), the benefits behind the performance measures are to benefit internal decision makers as they provide information that helps and facilitates the decision makers to make the right decisions as well as addressing people's efforts within an organisation in order to promote the efficiency of the organisation. Moreover, performance measurement helps to improve the communication inside the organisation by supporting vertical communication in two different ways (Beretta, 2002) concerning:

- "The principal", through the choice of performance measures and by determining their standard value, exercises his/her influence by expressing his/her expectations.
- "The subordinate" can use both the objective setting and the result measurement phase in order to build a constructive dialogue with his/her principal.

Performance measurement also supports horizontal communication by encouraging the different departments in an organisation to interact and share useful information in order to improve their activities. Thus, performance measures are considered as a signal of requested behaviour and can be powerful tools to explain and identify responsibility for different employees and their expectations. Moreover, performance measures motivate employees to increase their knowledge of their area of activity and its economic structure (Beretta, 2002). Performance measures contribute to the overall knowledge by inspiring learning about how efficiency and effectiveness can be enhanced and improved. Finally, they encourage inquiry by writing questions, investigating problems, finding answers, providing knowledge regarding the contribution of each single department to the firm's objectives, and finally performance measures can support management on the operational side connecting activities along the work flow and on the cognitive side developing integration knowledge (Beretta, 2002; Madapusi and Souza, 2012; Ram et al., 2013; Ram et al., 2014). Therefore, evaluation measures should be implemented from the establishment of any project, Furthermore, performance measures that evaluate the impact of the new system must be built in carefully so the evaluation clearly indicates how the system is performing and encourage the desired behaviours by all functions and individuals (Umble et al., 2003; Tsai et al., 2008; Tsai et al., 2012). The next table (3.8) summarises the benefits of performance measures:

<table>
<tr><th colspan="3">Table 3.8: Benefits Behind the Performance Measures</th></tr>
<tr><td colspan="3">- Inspire internal decision makers.
- Provide information that helps and facilitates the decision makers to make the right decisions.
- Highlight people’s efforts within an organisation in order to promote the efficiency of the organisation.
- Provide integration and helps communication inside the organisation in two ways;</td></tr>
<tr><th colspan="2">Horizontal Communication</th><th rowspan="1">Vertical Communication</th></tr>
<tr><th>The Principal:</th><th>The Subordinate:</th><td rowspan="2">- Provide useful information in order to improve their activities.
- Explain and identify responsibility for different employees and their expectations.
- Increase knowledge
- Contribute to the overall knowledge.
- Inspire learning about how efficiency and effectiveness can be enhanced and improved.
- Encourage inquiry by writing questions, investigating problems, finding answers.
- Support management in the operational process.
- Support management in the cognitive process.</td></tr>
<tr><td>through the choice of performance measures and by determining their standard value, exercises his/her influence by expressing his/her expectations</td><td>can use both the objective-setting and the result measurement phase in order to build a constructive dialogue with his/her principal</td></tr>
</table>

Source: (Summarised by the researcher).

Only a few popular techniques for measuring the performance of Information Systems in general have been described. Bititci and Turner (2000) provided an Integrated Performance Measurement Systems (IPMS) model in order to examine the structure and the link between performance measurement systems and they claim to have developed a reference model and an audit method for IPMS. Moreover, Bititci and Turner have also discussed different kinds of performance measurements models such as:

- BSC model, which has been proposed by Kaplan and Norton (1996).
- Strategic Measurement for World-Class Manufacturers (SMART) model, which has been developed by Maskel (1989).
- Performance measurement questionnaire that has been created by Dixon et al. (1990);
- Performance criteria systems, which have been proposed by Globerson (1985).
- Cambridge performance measurement design process, which has been created by Neely et al. (1995).

- Integrated performance measurement systems reference model, which has been developed by Bititci et al. (1998b) and Bititci et al. (1998a).

Hagood and Friedman (2002) separated the BSC measure into five different perspectives. These perspectives are strategic planning, finance, customers, internal business and innovation. They went on to use learning-based performance measurement systems in order to assess the performance of human resource information systems for the public personnel executives. One year later, Heo and Han (2003) proposed a model to examine the relationship between Information Systems and the essential measures of Information Systems assessment, which depends on the previous studies.

Stensrud and Myrtveit (2003) applied Data Envelopment Analysis to create a model that is suitable for the productivity measurement of outstanding ERP projects. On the other hand, Lin et al. (2006) applied statistical methods to ERP implementation by providing a pair of performance indicators. As mentioned above, previous articles have provided many useful performance indicator systems for Information Systems performance evaluation. Nonetheless, the most often adopted performance indicator systems refer to the common indices without developing a customised measure, which reflects the objectives of the ERP implementation project.

Over the last decade, researchers have focused on ERP performance in general. For instance, Chen and Lin (2008) used a method based on a stochastic flow network model to evaluate the performance of an ERP system, depending upon the results of the ERP examination of the users involved. Wei (2008) aimed to construct a framework to elaborate the development of ERP process improvements and to link the content of ERP performance measurement with consideration of ERP implementation. The study by Wei (2008) has adopted performance measures such as data accuracy, believability of output, system accuracy and usefulness of output from the relevant literature. Many organisations have assigned their time and attention to choosing and adopting an ERP system, but then fail to evaluate the effectiveness of the adopted ERP systems. According to Wei (2008), the reasons why organisations should assess the performance of their ERP systems are as follows: Firstly, installing an ERP system requires large investments of money, time and energy. Secondly, the adopted system will influence all future business operations and strategies.Thirdly, implementing an ERP system requires the work process to be customised and tailored to the business practices of the company.

Finally, a successful system should meet the current and future requirements in a context of continuous upgrade; consideration of its maintenance is very important.

Based on the above reasons to evaluate the performance of any ERP systems, assessing the development produced through several dimensions and aspects of performance such as quality, timeliness and efficiency could be more valuable than only focusing on assessing the finally result of an ERP system's implementation at the bottom line of profit and loss statements. According to Wei (2008), the evaluated technical enhancements that have followed the ERP systems implementation phase, sometimes are very weak. This is because for ERP systems, compared to the existing systems that work along with the management such as Total Quality Management (TQM) and Activity Based Management (ABM), their physical implementation is basically not enough to activate their inner potentialities as well, as they are only potential value producers (Wei, 2008). Moreover, since the early part of the millennium, Fraser and Fraser (2003) have criticised earlier performance measurement tools that normally depend on output measures such as completing projects on time or on budget, meeting sales targets, or fulfilling production quotas. They argue that such methods are not able to isolate the contribution of individuals from the effect of inessential variables such as bad weather, market fluctuations or political events.

Gattiker and Goodhue (2005) focused on the organisational components of the ERP systems. They have proposed a model focused on the sub-unit level of the organisation, assuming that the impact of ERP systems integration and standardisation will be affected by the interdependence and differentiation between subunits. Ifinedo and Nahar (2006a) have a wider view of the evaluation of ERP systems; they have stated that ERP systems implementation has five components: technological, operational, managerial, strategic and organisational. For them, (Ifinedo and Naha, 2007), the measurement models that have been used to evaluate ERP systems could not be accurate and satisfactory because the previous models do not cover the five components of ERP systems implementation.

According to Kvavik et al. (2002), efficiency is considered as essential study beyond assessing the success of ERP systems. However, Rabaa`i et al. (2009) declared that assessing the impact of ERP systems is a challenging issue because it is frequently influenced by three factors: human, organisational and environmental factors. That goes along with Fowler and Gilfillan (2003) who stated that evaluating the advantages and the benefits that have been provided by an implemented project could be difficult as most of the benefits can be intangible and hard to measure. Therefore, Chien and Hu (2009) developed a framework to seek a better explanation of the social factors related to the successful implementation of ERP systems based on investigating the role that employee self-efficacy plays in ERP effectiveness. In their study, they noted that ERP systems training and learning expressively enhanced the effectiveness of the ERP systems.

According to Heo and Han (2003), empirical studies that aim to define the impact of contingency factors recommended by previous scholars are essential; moreover, other possible normative factors (external environmental variables and organisational variables) have to be included along with the contingency factors. Examples of external environmental variables are industry, competitive environment and culture while examples of organisational variables are mission, size, goal, Information Systems maturity, structure, and evaluator perspective. Arunthari (2005) agreed that studying the impacts of ERP systems on user performance is a significant way to assess the utility of these applications implemented within the different sectors and how they contribute to performance efficiency and effectiveness. Shatat and Udin (2012) stated that if the organisation does not realise and understand the actual impacts of the ERP system on the stakeholders' performance, and are not prepared for the large changes, this might affect the performance of the whole organisation. Therefore, measuring the performance of ERP systems among the different stakeholders inside an organisation becomes important.

3.5 Stakeholders in Information Systems/ERP Systems

Many studies have used and considered the end-users as stakeholders of Information Systems/ERP systems in their perspectives on both what causes resistance to the ERP implementation or factors that enable effective implementation. On the other hand, several studies have used different perspectives such as user satisfaction in order to measure the success factors of ERP implementation (Somers et al., 2003; Wu and Wang, 2007; Anjum, 2011).

Additionally, Boonstra (2009) have stated that key users need to be represented at every stage from the establishment of ERP systems implementation, and continuously until the post-implementation phase and beyond so that changes in opinion are made visible and commitment to successful implementation is retained. The results in the study of Davis and Comeau (2004) matched with the suggestions by Maleki and Anand (2008); both studies have stated that in the case of ERP systems' users such as workers and managers should be considered as key stakeholders in the implementation phase as well involved in the post-implementation phase.

There is a vast difference in the concept of stakeholders and who should be involved in that concept in the existing literature. According to Freeman (2001), stakeholders are any groups or individuals who are influenced by or affect the accomplishment of an organisation's goals. Moreover, stakeholders can be classified whether from inside an organisation or external to the organisation; therefore, the term stakeholders covers a wide number of group or individuals such as the clients, landlords, suppliers, staff, local people in the environment of any business (Adelakun and Jennex, 2002). The following table (3.9) has been adopted from the work of Carroll and Nasi (1997) to clearly demonstrate the concept of stakeholders:

Table 3.9: The Concept of Stakeholders

Stakeholders	Stakes	Condition/ Rewards
To affect and to be affected In different environment Internal, external changes Primary, secondary stakeholders Internal, external conditions	Interest Rights Ownership	Money Goods Information Status Power

Source: (Carroll and Nasi, 1997).

Alternatively, different scholars have used stakeholder analysis for different reasons and for different contexts. Seng and Leonid (2003) have mentioned that in the universities' context, it is difficult to define a unique role for a given group of people. To make it clearer, students could sometimes be one of the stakeholders because of their participation in the learning process; however, graduates are considered as output from the education process. Thus, based on the above definition, the concept of stakeholders highlights a large number of groups or individuals such as clients, vendors or suppliers, students, academics, owners and employees.

During the last two decades, many researchers in the field of Information Systems and ERP systems have focused on user satisfaction as a measure for the human aspect of systems success; therefore, according to Myers et al. (1997), user satisfaction is considered as the most widely implemented measure in order to assess Information Systems success. However, as has been mentioned in the previous section, problems may be faced in assessing the success of Information Systems directly and has been found not to be effective and is impracticable. This is because of the intangibility of costs and the difficulty of first recognising the benefits and then converting values to their financial equivalent (Holsapple et al., 2005). Based on that, a set of scholars have agreed that user satisfaction is a decent substitute measure of Information Systems success (Seddon and Kiew, 1996; Zviran et al., 2005; Wu and Wang, 2007; Hou, 2012; Sugianto and Tojib, 2015).

Some of the related studies have assessed the performance of Information Systems through analysing the perspectives and the knowledge of users such as employees, middle managers, top managers and system engineers; however, using user satisfaction as a measure still faces critical issues. According to Wei (2008), the success of any Information Systems depends to a large extent on perceived satisfaction as well as including overall satisfaction, information satisfaction, software and hardware satisfaction and finally decision-making satisfaction. At the beginning of the 80s, a model of End-Users Satisfaction (EUS) was proposed by Bailey and Pearson (1983) and it has been considered as one of the most important and dominant models in Information Systems studies. Bailey and Pearson have added 39 factors in their model in order to link user satisfaction and Information Systems.

In the work of Mahmood et al. (2000), they addressed 45 End-User Satisfaction studies published between1986 and1998; the main aim of their review was to focus on the relationship among EUS and nine variables. Those nine variables are: perceived usefulness, ease of use, user expectations, users' skills, and users' involvement in systems development, organisational support, perceived attitude of top management to the project and finally users' attitude to Information Systems in general. The findings of the previous study showed a positive relationship and a positive impact for all nine variables; however, the positive impacts were at different degrees and levels. In addition, another study by Seddon et al. (2002) analysed the perceptions of 80 senior Information Technology managers from the European Union countries regarding Information Technology evaluation methods and the different advantages/benefits from such systems that have been offered to their organisations. They used a custom-designed survey created around three dimensions: evaluating the overall Information Technology portfolio, evaluating individual projects and applications, and finally evaluating the Information Systems function. Au et al. (2002) created reliable and valid instruments in order to evaluate the performance of Information Systems by developing a framework based on the equity and needs theories, which was totally different than the previous studies that aimed to address and identify the strengths and weaknesses of Information System

End-User satisfaction measurements. Moreover, Au et al. (2002) evaluated the applications of Information Systems instead of forecasting behaviours.

Indeed, there are different perspectives related to user satisfaction, Moshe (2003) has investigated the level of satisfaction that has been added by ERP systems and compared the results to the level of satisfaction gained from the traditional Information System studies. Additionally, Moshe (2003) tested a number of hypotheses related to the possible relationship between user satisfaction and six user characteristics: department functionality, position in organisation, formal education, age, computer experience and gender. In the study by Bradley and Lee (2007), the training has been chosen to assess one characteristic of user satisfaction by considering gender, educational level and job type. In addition, Bradley and Lee (2007) extended the technology acceptance model (TAM) for ERP systems projects by integrating satisfaction with training as a factor in perceived ease of use.

In order to increase the understanding of the EUS backgrounds, Au et al. (2008) created a new model based on the integration of three validated theories: the expectation theory, the need theory and the equity theory. The significance of this model is to realise that different needs, requirements, goals and purposes such as work performance and self-development have to be achieved by each individual. To satisfy the objectives of their study, Au et al. (2008) distributed questionnaires to employees in the service sector such as hotels and airlines and they collected and gathered a sample of 922 participates. The result of their study was that Information Systems users have dissimilar requirements and needs. The recommendation of their study was that focusing on technical aspects of Information Systems evaluation only, which might not be sufficient.

Calisir and Calisir (2004) have studied a number of usability factors that have an impact on end-user satisfaction in the field of ERP systems environment. Those usability factors are systems capability, compatibility, and perceived ease of use, flexibility, user guidance, learnability, perceived usefulness and minimal memory load. Indeed, Longinidis and Gotzamani (2009) undertook a similar study to that of Calisir and Calisir (2004), looking at major factors, such as department of employment, formal education, age, computer experience and gender, that shape the user's satisfaction. The main goal of their study was to discover whether satisfaction with ERP differs according to users' profiles. In addition, Hsu et al. (2008) have attempted to assess two main objectives: the success factors for ERP implementation and the level of user satisfaction in the dimension of system success. They have provided a framework for the innovation of diffusion theory integrated with the DeLone and McLean's (D&M) Information Systems success model. The findings of their study regarding the implementation of ERP systems were that user satisfaction has a significant influence through user participation and observability. Moreover, there is a strong relationship between user satisfaction and individual performance. Finally, individual performance has a positive association with organisational performance. Wu and Wang (2006) assessed ERP systems ultimate user satisfaction based on using a reliable and valid instrument with 23 different items, whereas another study by Aladwani (2003) endeavoured to address the relationship between attitude, behaviour and consistency of assumptions, and to explore their relevance to information satisfaction. Notwithstanding all that has been written on user satisfaction and how widely it has been used and implemented by many scholars as has been mentioned in this section, Doll et al. (2004) stated that the characteristics of subgroups have not been sufficiently investigated. Therefore, they used the proposed model by Doll and Torkzadeh (1989) End-user Computing Satisfaction (EUCS) to examine the correspondence of the factor loading and the structural weight of the subgroups based on the positions of respondents, types of application, hardware platforms and modes of development.

According to Beaudry and Pinsonneault (2005), user adoption is considered as another aspect of the Information Systems stakeholders' behaviour. Thus, they argue that developing a framework that has the ability to combine methods in order to study the behaviours and the results of user adoption is highly needed. Another study by Lim et al. (2005) has looked at users' motivational dynamics from an expectancy viewpoint, and stated in their case study that while other scholars in the field of Information Systems were interested to realise the utilisation of ERP systems among organisational associates, however, the expectations and motivation of their studies regularly remain at a routine level. Holsapple et al. (2005) have performed an empirical study in order to investigate users' characteristics such as age, education level, management level, Information Systems experience, and finally other factors such as package localisation, compatibility, and task relevance, which could determine ERP user satisfaction.

Practically, in the case of ERP systems, many studies found in the literature have studied them from different perspectives. A study by Aladwani (2001) stated that marketing ideas and ERP implementation strategies can be linked together to assist in overcoming workers' resistance to the adoption and use of ERP systems. Motwani et al. (2005) stated that addressing the factors that cause the success or failure of any ERP systems project could be critical and very difficult; they have concluded their study by addressing some aspects such as cautious, evolutionary, bureaucratic implementation processes, change management, network relationships, and cultural readiness, which can have a positive influence on ERP systems' implementation success. Another study by Low and Ngai (2007) discovered the correlation between organisational factors such as strategic intent and the possible effects of organisational variables on these constructs and the extent of Business Process Improvement (BPI) success.

Evaluating the user satisfaction in the context of ERP systems, required different methods and approaches than those that have been used to develop traditional data processes; therefore, Wu and Wang (2005) distinguish between two main types of ERP systems users: (1) key users, selected from the operating department, generally familiar with the business and having knowledge of their own domain; (2) end-users, for whose requirements the system was ultimately developed.

Wu and Wang believed that key users have a crucial role in the systems' success. Therefore, they focus on them to evaluate user satisfaction as a means of determining system success, by developing a set of 21 items in a framework of three dimensions: professional capabilities of suppliers, technical competence of contractors and training. One year later, Wu and Wang (2006) declared that user satisfaction is the extent to which users believe that the Information Systems available meets their information requirements. They also assume that improved performance will automatically follow if the system meets information needs. This does not mean that satisfaction causes performance; in fact, performance and user's satisfaction are both caused by the extent to which requirements are met (Ibid).

There is a lack in the information systems/ERP systems literature about stakeholder performance. Therefore, based on the above discussion, there is a need to focus more on the social aspects in evaluating ERP systems performance. This is crucial not just from the satisfaction point of view, but also from the different end users' performance perspective in order to highlight the factors that highly influence the performance of the different stakeholders while using ERP systems in their work environment.

3.5.1 Stakeholders' Evaluation

As a starting point, several authors deliberated the need for a holistic method in order to define, determine and collaborate with all stakeholders (Feurer and Chaharbaghi, 1994; Berg, 2004; Reed et al., 2006; Prell et al., 2009). Project Management Institute (PMI) stated that the holistic approach will help any project processes to be integrated with overall business activities and restrain incoherency from reigning and creating chaos (Lynch, 2004). In addition, PMI added that the perspective on project success has expanded by including all stakeholders' perceptions, not just the managers' observations. Therefore, during the last three decades, there has been a wide-range of difference opinions in the literature regarding the matter of stakeholders' assessment and who should be included as stakeholders (Tarhini et al., 2015; Altamony et al., 2016).

Many researchers and scholars have used stakeholder analysis for different purposes and inside different contexts and limitations in several sectors. Seng and Leonid (2003) explained how both students and graduate students can be encompassed by the term stakeholders. Eventually, a detailed approach to identifying stakeholders arose with different groups; those different groups each depend on which organisation they belong to. The study by Freeman (1984) and the study of Eden and Heijden (1993) both used the stakeholders' concept mainly as an instrument to investigate the external environment of a specific organisation in order to help and assist top managers with their strategic decision-making.

The term stakeholders in the field of Information Systems/ERP systems started to be used only during the last two decades. Therefore, according to Pouloudi (1999) there is some misunderstanding and confusion about the idea of stakeholders in the field of Information Systems. This confusion was narrowed down by seeking for a deep understanding of the term stakeholders. Seng and Leonid (2003) point out that the need to include stakeholders in Information Systems decision making has been highlighted in the literature by some authors. Moreover, they mentioned another study that included primary stakeholders and internal stakeholders such as suppliers and user group.

Indeed, there is a difference between the terms stakeholders and members regarding the development of Information Systems. This difference can be explained by defining members as individuals, groups or organisations who are interested in developing the process of the systems, while the stakeholders can be defined as participants whose opinions can affect or be affected by the development and the use of the systems in a direct way or indirectly (Pouloudi and Whitley, 1997). Based on the definition of Pouloudi and Whitley (1997), stakeholders play an important role in the development of Information Systems, and Blyth (1999) stated that the most important characteristic of Information Systems are gathering and validating of stakeholders requirements. Moreover, those requirements can be divided into a couple of areas ‘technical’ and ‘social’. Although, technical and social aspects are considered as the most fundamental aspects, the stakeholders can interact with other aspects such as satisfaction or development (Blyth, 1999). Fowler and Gilfillan (2003) agreed with Blyth (1999) and they state that it is essential to identify and address the stakeholders of any Information Systems project and assure the systems meet their needs and requirements. Based on the above studies, stakeholders provide an active contribution to the elicitation, analysis and communication of requirements, which have to be applied within an Information Systems project. Therefore, identification of stakeholders’ roles is considered a critical factor in the system’s success. Despite the importance of interaction and collaboration of stakeholders regarding the Information Systems project, stakeholders are considered as the first challenge in any Information Systems project (Ballejos and Montagna, 2008).

Other researchers have focused on other aspects, such as enhancing human performance and that aspect became a primary objective for many contemporary organisations in order to promote their organisational competitiveness. For instance, the study of Marshall et al. (2002) stated that organisations have to expand their considerable resources in order to develop their employees’ task and job performance. While many studies in the literature have addressed the essential role of assessment that can be gained from the users’ perspectives (Wilkes and Dickson, 1987; Gefen, 2002; Wu and Wang, 2006; Tarhini et al., 2015), Saunders and Lewis (2012) stated that people’s perspectives are not sufficient to appraise Information Systems; this is because people in different positions and different areas at several organisational levels have different viewpoints on the Information Systems’ performance.

During the last three decades, many researchers have agreed that organisations can use stakeholder analysis as an alternative way to satisfy the interests of their stakeholder groups (Preston and Sapienza, 1990; Freeman, 1993; Goodpaster, 1993; Jones, 1995). Wood et al. (1995) have added another point of view by stating that using stakeholder analysis combined with other analytical methods as an explanatory framework would help to develop the business processes. According to Pouloudi (1999), researchers and scholars have been concentrated on the ways that stakeholders' analysis can enhance and develop several areas such as planning, strategy decision making and either development or implementation of Information Systems.

After the emergence of ERP systems, researchers have transferred their interest and concern to different objectives and carried with them the stakeholders' analysis to the ERP systems studies in different contexts in order to get better understanding of stakeholders' analysis and its benefits for ERP systems. A study by Park et al. (2007) has investigated the absorptive ability of the different users/stakeholders while they are using the implemented ERP systems. They have only targeted the Korean context, which is a limitation of their study. In order to achieve their objective they proposed five performance measures: the degree of improvement in job performance, enhancing the speed of task performance, enhancing job productivity, making it easier to perform tasks, and finally the degree of overall satisfaction with the system. Zhang et al. (2005) studied a different subject, the success of ERP systems' implementation. They have declared that the success of ERP systems can be assessed in four different dimensions: user satisfaction, individual impact, organisational impact and intended business performance improvement. However, Chang et al. (2008) stated that the approaches that have been used to assess ERP systems' performance are only limited by the different units of enterprises, thus, they have provided a conceptual framework to appraise the performance and competitive benefits of ERP systems based on the viewpoint of supply chain management.

Additionally, in the context of Northern European countries, a study by Ifinedo and Nahar (2006b) has adopted the proposed model by Gable et al. (2003) in order to examine the success measurement of ERP systems through top managers' and middle managers' perceptions. They have included other items in the adopted model such as the workgroup impact, which was suggested by Myers et al. (1996). Moreover, they combined another two dimensions (vendor and consultant quality) in order to achieve comprehensive results regarding the success measurement of ERP systems through top managers' and the middle managers' perceptions in two small Northern European countries (Myers et al., 1997). However, by using another type of analysis, which is the hierarchical analytic process, Islam and Rasad (2005) have assessed employee performance in a service organisation based on several dimensions. Those dimensions are the quality and quantity of work, planning and organisation, initiative and commitment, teamwork and cooperation, communication, and finally external factors. Wang and Huang (2006) have expanded the previous study by Islam and Rasad (2005) by providing an empirical study, which has assessed engineers' performance as well as investigated the extent of stakeholders' performance and their association with project success. Wang and Huang (2006) have stated that there is a positive relationship between the project success and the stakeholders' performance.

The need to develop a comprehensive model to measure the success of Information Systems implementation has been suggested in the past by the study of Abreu and Conrath (1993) and their proposed integrated model has been considered as guideline for many studies since. The significant aspect in the model is focusing on stakeholders' expectations, which can be considered as the main indictor for Information Systems outcomes and influence. The model of Abreu and Conrath (1993) has been built by integrating the existing research streams of factor studies, process studies and expectancy studies. Therefore, their model has taken into consideration the different stakeholders' views of the process. This is because the model has used a multi-perspective method (Abreu and Conrath, 1993; Church and Bracken, 1997; Fraser and Fraser, 2003; Wood et al., 2004; Boonstra, 2006; Ifinedo and Nahar, 2007).

A multi-classification assessment technique known as 360-degree feedback was developed by Fraser and Fraser (2003) in order to measure managers' performance. The 360-degree feedback technique was created by the integration of an innovative technique administered only to the most senior levels and human resources management strategy developed by Church and Bracken, (1997). According to Wood et al. (2004), the 360-degree feedback technique became widely used in order to evaluate subjective capabilities. In the case of ERP systems, the previous technique become a common technique to appraise managerial aspects of stakeholders' performance; however, it has not been recommended by researchers to evaluate individual stakeholders' performance in ERP systems (Boonstra, 2006; Mehlinger, 2006; Ifinedo and Nahar, 2007). Therefore, the study by Boonstra (2006) stated that Information Systems/ERP systems are considered as a product of human actions as well as both of them being affected by human actions. That means humans initiate, design and plan the system, and finally use the system to achieve their goals. Thus, it would be interesting to investigate how the outcome of ERP implementation can influence the benefits of ERP systems for stakeholders and how they might respond to affect the ERP systems.

Another study in the literature has assessed ERP systems by focusing on the utilisation perspective in order to improve organisational efficiency and effectiveness from organisational groups' viewpoints; those groups are Information Technology professionals and business managers (Ifinedo and Nahar, 2007). On the other hand, Mehlinger (2006) noticed that several implementations of ERP systems have been unsuccessful in the past couple of years. This is because of the weak arrangement, planning and impedance to acceptance of the changes and the lack of assessment in the post-implementation stage for the two aspects, which are the technical and the social aspects. Based on the above discussion, it can be seen that the evaluation of the different stakeholders in order to get a better understanding of the performance is essential to improve and develop the ERP systems to meet the expected requirements of each stakeholder.

3.6 ERP Systems in the Public Sector

Periseras and Trarabanis (2000) stated that some governments have responded to their citizens' demands by implementing the most current developed technologies into their public organisations and departments in order to provide high quality e-services. As a result, the successful adoption of ERP systems techniques that appeared in the private sector was one of the solutions to achieve the citizens' needs (Veal, 2001). Up to 13 years ago, researchers and scholars had covered the adoption of ERP systems in the private sector significantly more than the ERP implementation in the public sector. Therefore, this could be the answer as to why the public sector has lagged behind the private sector (Harris, 2004). However, according to Kavanagh and Miranda (2005), this gap has started to narrow as public sector organisations of all sizes have increasingly adopted the appropriate ERP systems to highlight the long-standing administrative inefficiencies and service delivery challenges associated with legacy administrative systems and processes.

To be more specific, in the late 1990s there was a huge wave of implementing ERP systems in the public sector, which has been driven by the need to replace systems with the year 2000 compliance issues rather than business process improvement (Kavanagh and Miranda, 2005). In 2001, Dorobek assessed that the American federal ERP market would grow at an annual rate of nearly 9% over subsequent years, thus reaching almost US$1.8 billion in 2005, representing more than 4% of federal expenditure in Information Technology (IT). However, like any new technologies, ERP systems have shown negative and failure stories that have been reported across newspapers such as King County, Washington ERP implementation project, which failed (Songini, 2005). Such stories of cost and schedule overruns, payroll issues, and finally financial reporting issues are likely contributors to a shift in market focus towards realising measurable returns on investment for ERP systems investments. After the year 2000, ERP systems adopters have tended to be more risk averse in their approach, and they started to shift from only focusing on replacing legacy systems to aim at expected return on investment as well (Harris, 2004). Therefore, the interest that has been caused by the ERP systems phenomenon in the public sector made specific studies of ERP systems in governmental and public organisations become necessary (Sprecher, 1999; Miranda, 1998; Harris, 2004; Nazemi et al., 2012; Ziemba et al., 2013).

Wagner and Antonucci (2009) stated that ERP systems are adopted in approximately eighty percent of five hundreds firms. Moreover, many organisations acquire and implement ERP to improve their operational performance and create strategic value; however, they fail to achieve these objectives due to lack of knowledge and understanding of ERP and its lifecycle (Nazemi et al., 2012). Moreover, the unpredicted failure behind the implementation of the ERP system could occur because of the lack of performance measurement of the main stakeholders or users of these implemented ERP systems (Nazemi et al., 2012; Dwivedi et al., 2015).

The previous discussion has covered some important debates on ERP systems in the public sector in general, which can be considered as the backdrop to the discussion in the following section, ERP systems in universities' context.

3.6.1 ERP Systems in Universities' Context

As a starting point, one of the main challenges that the universities' context is faced with is how to cope with the development of new technologies. According to McGaughey and Gunasekaran (2009), ERP systems have become more prevalent in the public context such as universities, hospitals and airlines in order to improve the efficiency and effectiveness of their services. Therefore, in the case of the implementation of the technology for ERP systems in the universities' context, there has been a lengthy debate in the literature about several issues. In the last three decades, some researchers and scholars have demonstrated the similarities and dissimilarities between businesses and universities in order to get a better and deeper understanding of how the universities context can use such technology to improve its services. Another study by Lockwood (1985) has investigated different dissimilarities and similarities regarding the businesses context and the universities' context. The findings of the study were that the dissimilarities could be summarised as follows: difficulty of purpose, limited measurability of output, autonomy and dependency from broader society, diffuse structure of authority and internal fragmentation. On the other hand, some of the similarities that have been mentioned by Lockwood are that both businesses and universities are facing the same issues such as organising resources, monitoring budgets, and facilitating enterprise among staff.

One of the main dissimilarities between businesses and the universities context is the different set of users. Indeed, universities have numerous users of ERP systems; each user has a different background, goals, approaches to practice, and different culture. As a result, those differences have highly influenced the universities' procedures and processes. According to Wagner and Newell (2004), universities' users are a combination of academics, administrators and students. Therefore, Wagner and Newell have studied the impact of the different cultures of administration on newly developing ERP systems that were recently implemented. As a result, they stated that cultural differences in the context of universities were considered as one of the main difficulties facing the implementation of ERP systems. The reason behind that is related to the different purposes and agendas of the different universities' users. However, two years after the previous study, Wagner and Newell (2006) stated that the context of universities is considered as important for ERP systems assessment. This is because the ERP system's structure and design has to reach and meet the requirements for the different university stakeholders including the administrators and the academics. Despite the similarities and differences between universities and business organisations, during the last two decades, ERP systems have played a remarkable role in every university department and in the IT management department in particular (King et al., 2002).

Most universities worldwide have started to implement ERP systems in order to eliminate the paperwork of the management and administration (legacy system), which is considered as old school management by adopting the new automated school management (Spathis and Ananiadis, 2005). This is because the competitive environment for universities worldwide has required the adoption of technologies and technical experts to contribute to the strategy development of dynamic IT systems that are able to support the universities' objectives and goals (Cameron, 2008). The study by Kitto and Higgins (2010) supported the previous study by Cameron (2008), stating that ERP systems focus on reducing the risks in the management of universities and in the meantime, ERP systems permit universities to cope with global competition. However, in order to decrease the gap between the outcomes and the job market requirements, universities have decided to focus on supply chain management as a solution to resolve the above difficulty (Alturki et al., 2008).

Over a decade ago, Zornada et al. (2005) declared that due to the increasing number of universities, there is a need to develop ERP systems in order to improve their operations and make them manageable and more transparent. Therefore, ERP vendors have responded to that and have already redesigned their solutions in order to satisfy the needs of universities. The main point of deploying the ERP systems in universities is to improve and develop ways of supporting the administrative and academic services such as human resource management, monitoring of employees, payments, investments and budget. In addition, ERP systems help the students' administration in different ways such as registration, student enrolment, students' records and finally the financial support for students. Therefore, adopting ERP systems within the universities' context has several advantages that have been expected by its users; those advantages are enhancing the university efficiency, quality, productivity and finally the effectiveness of ERP systems users. The previous advantages have also been supported by the study of Kitto and Higgins (2010), who stated that ERP systems have played a specific and important role in government within the universities' context; their study has investigated the implementation of one of the ERP systems types, which is online educational technology at Australian universities. The result of their study was that ERP systems have a positive correlation between the implemented ERP systems and the expectation of its users. The second issue has been an increase in the literature regarding to ERP systems in the universities' context on the benefits and the advantages that can be gained by implementing such a system in universities. In earlier years, a study by Swartz and Orgill (2001) has summed up the benefits of implementing ERP systems in the context of universities. The following table (3.10) shows the advantages that have been summarised by Swartz and Orgill (2001):

Table 3.10: The Advantages of Implementing ERP in the Universities' Context	
Themes	**Benefits**
Productivity	Improve access to information
	Improve workflow and efficiency
Awareness	The ability to improve controls
	The ability to improve programme alerts
Interfaces	The availability of easy-to-use web interfaces
Individual	Helps the individual in the project to develop a new work ethic
	Helps the individual within the project to disseminate positive attitudes in the workplace

Source: (Swartz and Orgill, 2001).

In addition, other advantages regarding ERP systems implementation in the universities' context were highlighted in many articles. Rabaa`i et al. (2009), mentioned four main advantages for implementing ERP systems particularly within universities. Those advantages are: improving the information access for planning and managing the institution; enhancing the services provided for the faculty, students and employees; lowering business risks; and finally increasing income and decreasing expenses based on improving efficiency. Additionally, based on the users' expectations and perceptions, a study by Spathis and Ananiadis (2005) has investigated the advantages in one of the largest public universities in Greece by considering three different dimensions in order to explore the impact of the advantages in relation to the accounting information and management. Those dimensions are managerial, operational and information technology infrastructure.

Other studies that have been found in the literature are related to the advantages of the implementation of ERP systems in the universities' context (such as King et al., 2002; Pegah et al., 2003; Bologa, 2007; Lupu et al., 2008; Bologa et al., 2009). The above researchers and scholars have investigated the advantages for the administrative systems' infrastructure that could be added by implementing ERP systems. Their findings were that ERP systems have provided many advantages for the administrative systems infrastructure. Those advantages are providing unlimited access to authorised users; providing maintenance of the system; reaching high performance and reliability; unifying the information and the processes related to the students, faculty and staff; promoting relationships; supporting better decision making; providing better flexibility to users; and finally providing easier and quicker access to data for reporting and decision making.

Other researchers have focused in their studies on exploring more strategic benefits that can be gathered from ERP systems in the context of universities. Some of the strategic benefits that were addressed by different authors are improving information access for planning and managing the institution, improving services for the faculty, increasing students', academic staff's and employees' productivity, lowering business risks and increasing income and decreasing expenses due to improved efficiency (Bologa et al., 2009; Lupu et al., 2008; Rabaa`i and Gable, 2009). However, notwithstanding all the advantages and benefits that can be obtained by the implementation of ERP systems in universities, there are some challenges which have been identified. One of the challenges was customising and updating its systems in line with the improvement of new technologies (McGaughey and Gunasekaran 2009; Nazemi et al., 2012). Thus, ERP systems tend to be very expensive, and take a relatively long time to be implemented (Ike and Mogens, 2005; Matt and Steve, 2006; Abugabah and Sanzongni, 2010a; Abugabah and Sanzongni, 2010b).

There is a wide range of studies that aimed to provide solutions or to explore a specific phenomenon regarding ERP systems in the universities context, particularly in different countries' contexts. Allen and Kern (2001) have conducted a study in four universities in the United Kingdom (UK) in order to investigate the effect of ERP implementation within the universities' context. The result of this study found that organisational culture and communication have significant effects on the implementation outcomes of ERP systems in UK universities. Another study by Judith (2005) has investigated the impact of ERP systems on business processes and performance in universities. The main questions of the study focused on whether or not ERP systems enhance the performance process and looked at the roles of factors such as leadership and culture and their effects on ERP and business performance. The study concluded that ERP systems potentially improve business performance in the universities' context by enhancing services offered to students, faculty, academics and staff. Kittner and Slyke (2000) took one of the United States universities, the University of Scranton, as a case study to investigate the significance of Information Technology support from the dimension of their academics and their administrative purposes. The findings of their study are similar to the findings, which have been produced by Klaus et al. (2000), and both studies have stated that the significance of Information Systems/ERP systems to academia emphasise supporting communication in different aspects such as research, updating the development of teaching materials and the associated concepts in university curricula, enhancing commercial education and training, and finally enhancing communication with university consultants and vendors.

The study by Allen et al. (2002), aimed to investigate whether a feasible Information Systems strategy can be obtained by implementing the ERP system in universities. Their study has taken four universities as case studies and these four universities were still in the implementation phase of ERP systems. Those previous studies have focused on the significance of ERP systems regarding the academic and administrative purposes as well as the feasible Information Systems strategy that can be offered by implementing ERP systems. However, other aspects have been considered by different researchers in the field. Zhu et al. (2008) proposed for the context of universities a similar model to the related model of business supply chain management in order to reduce the current gap between universities' outcomes and the market needs. A similar published work by Fowler and Gilfillan (2003) developed a framework to improve the implementation and the development of complex ERP systems in the universities' context**.** Based on the results of their study, they have suggested general guidelines to improve the cooperation between different stakeholders such as university top managers, IT teams, and finally the vendors of the ERP systems (Ibid). Another study has provided a framework to investigate the technical aspects of ERP systems in Romanian universities (Sabau et al., 2009).

Seng and Leonid (2003) developed a model that includes stakeholders and their objectives, resources and services in order to highlight the impact of information support in the university environment. Their study has taken Monash University, which is considered as a one of the oldest universities in Australia, as a case study to achieve their objectives.

Additionally, the return of investment was one of the aspects that has been mentioned by researchers in the field. Hayes and Utecht (2009) assessed the return on investment in a university which has implemented ERP systems and the second objective of their study was to investigate the management of organisational change after the implementation phase. There is a study which has stated that in Australia the overview of the ERP systems in the universities context has resulted in yet a further layer of change in universities to replace old administrative and management systems with new ones (Beekhuyzen, el al., 2002). However, one of the reasons that universities have adopted ERP systems is to improve performance and learning services, and also to become more efficient in their operations, and, in part to deal with the range of other changes they have been facing (Fisher 2006). Consequently, in the last fifteen years, universities have begun to implement ERP systems to replace old and outdated systems with more efficient systems (Cornford and Pollock, 2001; Marginson, and Considine, 2000). However, according to Beekhuyzen, el al. (2001), little research effort has been made on this particular topic concerning universities. They have stated that focus on an Australian environment has been neglected, especially when it is understood that more than 85% of Australian universities have implemented ERP systems (Ibid). In addition, most of the famous ERP systems suppliers provide solutions for the universities' context, including SAP, Oracle, JD Eduards and PeopleSoft. On the other hand, some universities prefer other specialised applications, which better fit their specific needs (Bologa et al., 2009).

However, in the context of Romania, the ERP systems market is still very young. Lack of funds in the educational system is a major factor of influence in adopting a complete ERP systems solution, considering the high costs involved not only by its acquisition, but also by its maintenance. This is a major drawback, especially for small universities; moreover, in the Romanian ERP systems market, there are several locally developed solutions, which respond to the specific demands of Romanian universities (Bologa, 2007).

The study by Mahrer (1999) investigated the impact of a successful ERP systems implementation in a Swiss university. The main finding of the study was that strong communication and coherence between the departments in the university was the main success factor for the implementation of the ERP system (Mahrer, 1999). Additionally, Oliver and Romm (2000) studied why universities sought to adopt ERP systems. That study however was limited, as it reported findings only from secondary data collected through some websites of ERP systems projects at universities in the United States and Australia. Chang et al. (2000) highlighted the importance of knowledge management in ERP systems implementation in the Australian public sector (including universities' context), and concluded that organisations must have a lifecycle-wide ERP systems knowledge-sourcing strategy.

According to Bradley and Lee (2007) there is a lack in the current literature regarding the investigation of effectiveness and efficiency of training in the context of ERP systems within universities' context. Therefore, they conducted a case study to investigate three main objectives; those objectives are the significance of training, the correlation between training and satisfaction, and finally the correlation between training and different factors such as perceptions of use, usefulness, effectiveness and efficiency. They concluded that the universities' context could be considered as the context of business organisations regarding the obstacles they encounter such as organising resources, managing costs and facilitating enterprise among staff in order to implement ERP systems. A similar study by Pollock and Cornford (2004) demonstrated the correlation among universities and other organisations regarding the functionality of ERP systems. Based on the above studies, ERP systems have become an essential tool, which has to be implemented in universities in order to enhance their efficiency and improve the responsiveness to academics' and students' requirements. Therefore, ERP systems success in universities subject has been categorised under two main headings: internal and external (Bologa et al., 2009). Internal can be linked to the cost, scope and duration of the implementation phase, while the external is concerned with improving and increasing the client/user satisfaction and systems quality (Ibid).

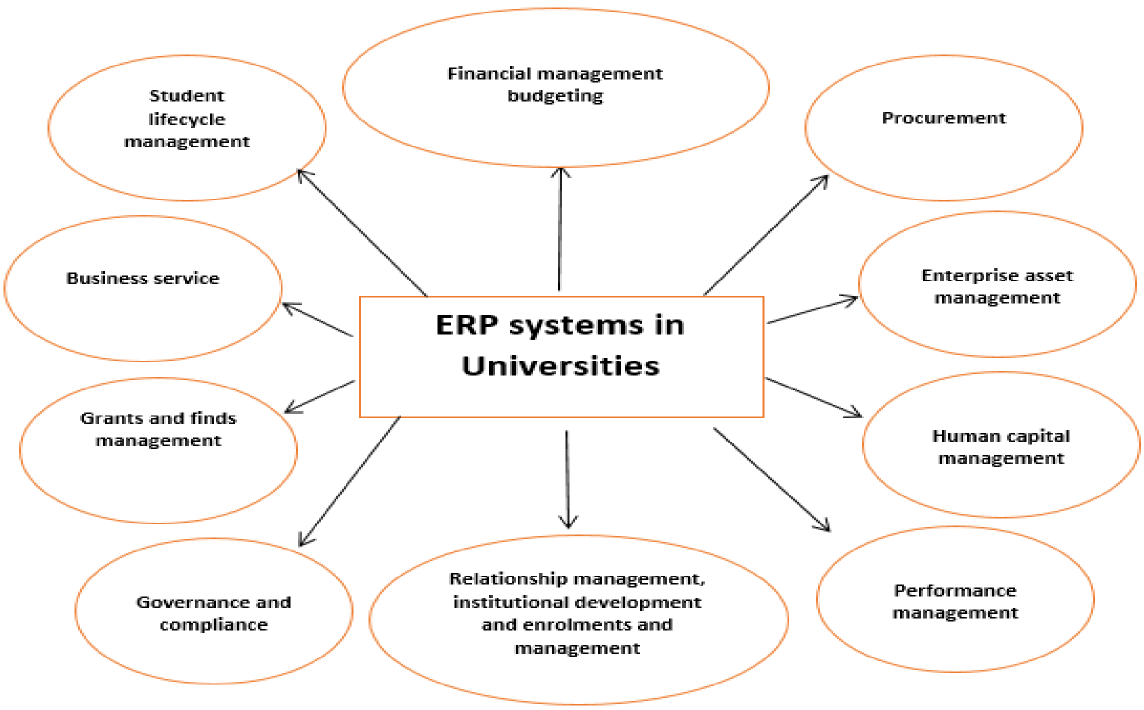
Based on the above studies by Bradley and Lee (2007) and Pollock and Cornford (2004), universities have made significant modifications in the implementation phase of ERP systems compared to other organisations. Those modifications arise in several processes such as communication structures, management involvement, organisation, implementation team competences, legacy systems, user training, interdepartmental communication, supplier/customer partnerships and finally external consultants. However, both studies have determined that the two factors, which are delivery on time and budget can play an important role in the success of any ERP systems implementation. The study by Wagner and Newell (2004) aimed to investigate the relationship between ERP systems' vendors and universities because both of them can work together to propose the best practice ERP systems for the universities' context. The previous study has another objective, which is to find the gap in the software design theory that has been adopted and the theory use within industries over the passage of time.

Information Technology investments and educational investments helped the United States make economic progress, which led to better and educated manpower outcomes (Jorgenson et al., 2004). Based on that fact, many researchers have started to investigate Information Technology and Information Systems investments in the universities within the context of their countries. A study by Okunoye and Folick (2006) investigated the main key steps to implement ERP systems in the universities' context. They use a Romanian university, Agora University, as a case study for their investigation. Moreover, they focused on the process of ERP systems selection and the departments linked to the systems. Another study determined a deep explanation of the ERP systems' implementation and assessment in the context of Australian universities (Rabaa`i et al., 2009).

The study investigated several characteristics of the ERP systems such as selection, integration, appraisal and the advisers' role at the Queensland University of Technology as a case study to achieve their main objective. The study by Mehlinger (2006) has adopted one of the most important theories in the leadership field, which is the transformational leadership theory in order to forecast the performance in the universities' context regarding the ERP systems implementation from the organisational culture viewpoint. The finding of the study was that the level of ERP systems' success could be examined by using the transformational culture particularly in the context of universities. The study by Bologa (2007) demonstrated the ERP systems model that is regularly used within the universities' context as an example.

However, Park et al. (2007) supported the users' requirements and demand for specific customisations, especially when the standardised ERP systems packages do not reach the different management processes such as in the universities' context. The following figure (3.3) shows one of the commonly used ERP systems in the context of universities:

Figure 3.3: The Most Common ERP Systems Model in Universities



Source: (Bologa, 2007).

Several economic terms in the literature have been used by researchers and scholars as part of the study of different aspects related to the ERP systems in the universities' context. A study by Norris (2003) used the term of 'value in investment' to measure the value of intangible advantages, and the 'return of investment' to measure the tangible advantages that can both be provided by technology innovation such as ERP systems. The study has justified the potential of using the value on investment term that would create competitive advantage for the context of universities. However, the aspects of curriculum, students and academics have been neglected and only a few scholars have investigated these aspects in the ERP systems' literature (Waston, 1999; Cameron, 2008; Eden et al., 2012).

Esteves and Pastor (2001) classified the ERP systems publications into different categories such as achievement, implementation, usage, development, retirement, education and evaluation. One of the main findings of their study was that there is a considerable gap in the ERP systems' literature regarding the different stakeholders' performance as well as the evaluation category. However, Genoulaz and Millet (2005) reviewed publications on ERP systems during the period 2003 to 2004 and they have presented six categories different to those Esteves and Pastor (2001) provided. Their six categories are implementation of ERP systems, optimisation of ERP, management via ERP, the ERP software, ERP for supply chain management, and finally ERP systems' case studies. Moon (2007) has agreed with the findings of Esteves and Pastor's study stating that there is still a lack in ERP systems' literature regarding universities and the different stakeholders' performance. The previous statement has been reported in the reviewed publications of several journal articles covering the period 2000 to 2006. Therefore, the organisational aspects are more significant than the technological aspects (Bologa et al., 2009).

ERP systems are facing several challenges and obstacles in the universities' context. Chae and Poole (2005) stated that in the context of universities, the two stages 'design' and 'implementation' are challenging and complex. This is because there are unique factors in the public sector particularly in the universities' context that could have a negative influence on the design and implementation phases. Those factors are commands, requirements and expectations. Similarly, Wagner and Newell (2006) have used one of the main universities in the United States as a case study in order to move forward the stalled ERP systems in the university. They stated that notwithstanding the improvement that can be provided by implementing

ERP systems, however, universities might face serious and complex challenges that lead to a high level of systems failure. Rabaa`i et al. (2009) acknowledge this complexity and high level of failure related to the ERP systems' implementation in the universities context and set their objectives to provide a deeper understanding of ERP implementation through evaluation of the ERP systems to address the reasons behind their failure. A study by Umble et al. (2003) also attempted to identify the reasons behind ERP systems failure and split them into ten groups. The following table (3.11) suggests the potential reasons for ERP systems' failure:

Table 3.11: Reasons for ERP Systems Failure

Categories	Explanation
Strategic goals	Strategic goals are not clearly defined
Top management	Top management is not committed to the system
Implementation	Implementation project management is poor
Commitment	The organisation is not committed to change.
Team work	A specialised implementation team is not selected
Training	Insufficient education and training results in users being unable to satisfactorily run the system
Accurate	Data accuracy is not ensured.
Performance measures	Performance measures are not adapted to measure the organisation change and the post-implementation.
Raised issues	Multi-site issues are not properly resolved.
Technical	There are technical difficulties.

Source: (Umble et al., 2003).

Many other scholars and researchers have published articles regarding ERP systems' implementation, regarding implementation procedures and business process and outcomes (Mandal and Gunasekaran, 2003; Markus and Tanis, 2000; McAfee, 2002; Hong and Kim, 2002; Scott and Vessey, 2002; Amoako-Gyampah and Salam, 2004; Sun el al., 2005). Despite further articles on vendor selection and implementation teams, ERP systems are still at the infancy stage (Abugabah et al., 2010).

To conclude, based on the previous discussion, universities have been strongly influenced by global trends to adopt new technologies. There has been a call by governments for universities worldwide to improve their performance and efficiency (Abugabah et al., 2013). Therefore, in response, universities have turned to ERP systems in order to cope up with the changing environment and overcome the limitations of legacy systems as a means for integration and performance improvement advantages (Allen et al., 2002; Bhamangol et al., 2011; Abugabah et al., 2013). ERP systems are the largest integrated software applications adopted by universities, along with quite significant investments in their implementation.

However, unlike other applications, little research has been conducted on educational ERP systems in the environment of universities compared to other ERP systems' environments (Bhamangol et al., 2011). As universities differ from each other, therefore, they need different environments and customised ERP systems to meet their users' expectations. The activities of universities are undertaken through ERP systems, for interacting with students, faculties, academic staff and management. ERP systems can give better information to academic staff, students, and the e-learning environment, which will help to improve the quality and performance of educational systems (Bhamangol el al., 2011; Seo, 2013). However, even recent ERP systems' research has neglected the social aspect and focused on the technical aspect more in the universities' context particularly in the developing countries, even though most universities have implemented or are in the process of implementing an ERP system (Abugabah and Sanzongni, 2010b; Tan and Sedera, 2015; Olugbara et al., 2014; Noaman and Ahmed, 2015).

3.6.2 ERP Systems in Saudi Arabia

According to Al-Mashari et al. (2003), a great evolution emerged in the Saudi public sector through adopting new technologies and over the last decade, the Saudi government recognised the need to adopt ERP systems in its different departments and organisations in order to shift away from the traditional and legacy systems. Thus, a broad range of case studies has been proposed by researchers in order to examine ERP implementation and its success factors in the Saudi Arabian context. Agourram (2009) conducted a case study to explore Information Systems' success, as defined and perceived by a group of managers in Saudi universities. The findings of this study stated that culture does influence perceptions of Information Systems' success, which poses problems particularly to organisations that decide to implement ERP systems. Indeed, a misfit, observed between the user perception and the built-in success assumptions of the package, is highly probable. Alballaa and Al-Mudimigh (2011) have conducted a case study to provide a better understanding of how change management strategies play an important role in enhancing ERP success in Saudi Arabia. Their findings suggest that differences exist among the 165 ERP acceptance reviewed strategies. Change management tasks can differ even within an ERP project; this is because different groups and individuals can be affected differently, and therefore such employees will need different ERP implementation strategies. This, in fact, matches with what Moohebat et al. (2010) suggested about developing countries being influenced by national culture during ERP implementation and being dependent upon ERP vendors.

Hossain et al. (2011) conducted six case studies to unfold the role of ownership and governance, scope management and employee empowerment during ERP implementation in Saudi Arabia. As the authors explain, the nature of ownership and governance plays a significant hindering role during implementation. They also found that Saudi organisations face major challenges during implementation with respect to managing the scope of implementation. Finally, they found that owners and top management are concerned about losing their control over employees following ERP systems' implementations. The following table (3.12) demonstrates several factors that have influenced ERP systems during the different stages of the implementation phase in Saudi Arabia. The study, through its explanation of difficulties of ERP implementation in the Middle East, and Saudi Arabia in particular, has also confirmed some findings of other previous studies (such as Aldammas and Al-Mudimigh, 2011; Al-Mashari et al., 2006). It is worth noting that most of the above studies involving culture are qualitative case studies on ERP systems' implementation, thus confirming the need for quantitative studies in Saudi Arabia associated with the behavioural adoption and acceptance of ERP systems users:

Table 3.12: Factors that have Influenced ERP Implementation in Saudi Arabia

Implementation phase	Ownership and governance	Scope of implementation	Employee empowerment
Chartering	Interference during vendor selection.	Lack of understanding of what modules to implement.	Employees were not involved in ERP system implementation decisions.
Project	Reluctant to change business processes and rules.	Scope up and down in the middle of implementation.	Employees did not receive adequate training.
Shakedown	Reluctant to delegate authorities to middle and low level employees		Employees did not have the authority to execute business processes

Source: (Hossain et al., 2011)

Additionally, the study by Alhirz and Sajeev (2015) highlighted the differences in ERP acceptance in Saudi Arabia. The findings declared that the structural equation model did not show evidence for power distance or individualism that could influence the perceived user resistance and involvement with ERP systems. Uncertainty avoidance has a significant influence over perceived user involvement and user resistance with ERP systems. Additionally, the perceived user involvement, the perceived user satisfaction and the education level moderates have positively affected the user acceptance of ERP systems. However, moderator variables did not show significant influence on this relationship, and finally, perceived user resistance negatively influences user acceptance of ERP, and the influence varies across the education levels of the ERP systems' users.

As a final point, most of the scholars and researchers focused on the general implementation and technical phases in ERP systems in the Saudi Arabian context (such as Al-Mashari, 2001 and 2002; Al-Mashari et al., 2006; Aldammas and Al-Mudimigh 2011; Alhirz and Sajeev 2015). Therefore, there is still a gap in evaluating the perceptions of the different stakeholders' performance in the public sector in general and the universities context in specific. The following section discusses the evaluation of ERP systems end users' performance.

3.7 Evaluation of the IS/ERP Systems End-Users' Performance

As a starting point, over the last three decades, the evaluation phase and the effect of Information Systems/ERP systems on both individuals and businesses have been used and applied by many authors in the field in order to reveal the significance of three main factors, which are: organising productivity, quality and effectiveness/competitiveness (Farbey et al., 1993; Irani, 1998; Land, 2001; Adelakun and Jennex, 2002; Irani and Love, 2008; Petter et al., 2013). The above scholars have argued that the analysis of the involved stakeholder is considered as a first step and an important preparation of the evaluation part. Therefore, they have agreed that most of the techniques have involved a wide variety of related stakeholders for specific systems or projects such as works, vendors, users and sponsors. According to Farbey et al. (1993), there is no such thing as a useless/impractical method. However, when objectives are fairly clear this may lead to the highest significance in the contribution of evaluation as a social learning mechanism. Moreover, they believe that, as a result of the evaluation process, the different stakeholders have the opportunity to improve their knowledge of the systems/projects and they will have the possibility to develop new skills.

This section focuses on reviewing the current literature regarding the main objective for this research, which is the effect of ERP systems on academics' performance in the universities' context. It also supports the researcher to adopt and develop one of the frameworks that has been validated and published by other scholars and researchers in the field. In addition, this section focuses on the three most widely cited Information Systems models that have been adopted by specialists and scholars to evaluate ERP systems performance. Those three models are: the DeLone and McLean Information Systems success model (2003); the Task-Technology Fit model (Goodhue, 1995); and the End-User Computing Satisfaction model (Doll and Torkzadeh, 1989). This section covers the background, strengths, inadequacies, implications and how the three widely cited models are related to the ERP systems. Finally, this section reviews the important empirical studies which have been published regarding the three models and the factors that have been proposed by other researchers in order to investigate the factors that have high impact and influence on academic staff's performance in the universities' context while they are using the implemented ERP systems. The following table (3.13) summarises the key researchers who studied and investigated the user performance.

Table 3.13: Key Researchers who Studied and Investigated the User Performance

Authors' Names	Year	Dimension and factors	Method
Goodhue and Thompson	**1995**	Individual Performance	Questionnaires
Torkzadeh and Doll	**1999**	Increase Productivity and Performance	Mixed Method
Goodhue et al.	**2000**	User Performance	Questionnaire
Chen	**2001**	Enhancing performance	Literature Review
DeLone and McLean	**2003**	User Performance	Literature Review (Updated Model)
Heo and Han	**2003**	User's Job Performance	Mail Survey
Lorenzo	**2004**	Managerial Issues - User Satisfaction	Literature Review
Sedera et al.	**2003**	Awareness - Recall – Individual Productivity	Survey
Staples and Seddon	**2004**	Performance Impact	Survey
Lim et al.	**2005**	Improve Productivity - Improve performance - utilization	Case Study
Pearson and Tadisina	**2005**	Performance	Email Survey
Torkzadeh et al.	**2005**	Task Productivity - Increase Productivity - Accomplish more Work	Survey
Islam and Rasad	**2005**	User Performance – Time to Complete Task	Absolute Measurement
Chang et al.	**2005**	User Performance on Job	Questionnaire
Wu et al.	**2007**	Net Present – Individual Performance	Case Study
Ifinedo and Nahar	**2007**	Recall for Individual Work -Improves Individual Productivity	Survey

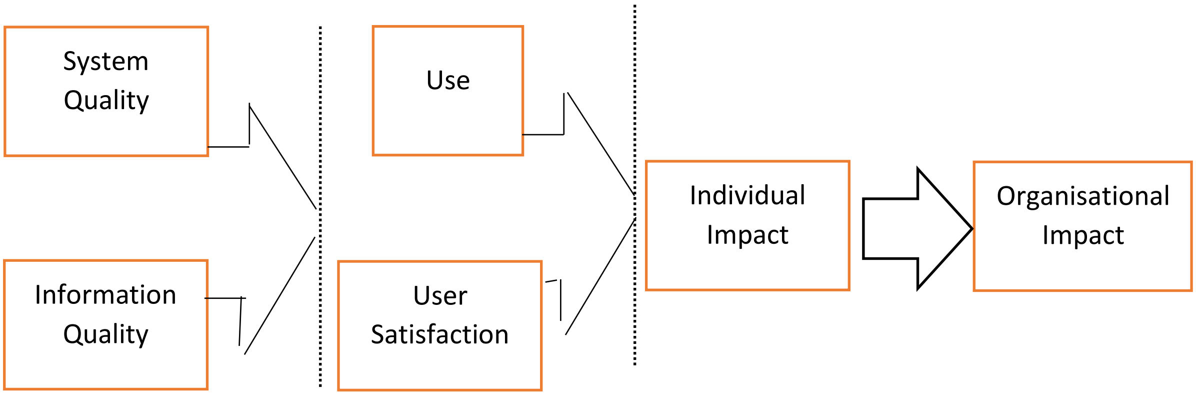
Law and Ngai	**2007**	Organisational performance - User Satisfaction	Questionnaire and Interview
Park et al.	**2007**	Improving Job Performance -Enhancing Speed of Task Performance	Questionnaire
Tsai et al.	**2007**	DeLone and McLean's IS Success Model - Individual Impact	Questionnaire
Bryson et al.	**2008**	Individual Users - User Satisfaction	Survey
Gable et al.	**2008**	Awareness – Recall - Individual Productivity	Survey
Au et al.	**2008**	Work Performance	Survey
Chang	**2008**	Performance Impact	Online Survey
Hsu et al.	**2008**	User Productivity - Task Performance - Task Accomplishment	Questionnaire
Sun et al.	**2009**	User Performance	Survey
Longinidis and Gotzamani	**2009**	Time Taken to Complete Task - Immediate Recall	Questionnaire and Interview
Chien and Hu	**2009**	System Awareness	Questionnaire
Petter and McLean	**2009**	Individual Impact	Literature Review
Petter et al.	**2009**	Individual Level	Literature Review
Kronbichler et al.	**2010**	DeLone and McLean IS model - Individual Impact	Literature Review
Abugabah et al.	**2010**	User Performance	Questionnaire
Petter et al.	**2012**	DeLone and McLean IS model	Literature Review
Ali and Younes	**2013**	User Performance	Survey
Abugabah et al.	**2013**	User Performance	Questionnaire
Petter et al.	**2013**	DeLone and McLean IS model	Literature Review
Nizamani et al.	**2014**	Individual Impact - User Satisfaction	Electronic Survey
Lamb et al.	**2014**	Improving System User Satisfaction	Literature Review
Shaikh and Karjaluoto	**2015**	Human Behavioural Intention	Literature Review

3.7.1 D&M IS Success Model

William DeLone and Ephraim McLean are considered as the most famous and effective key authors in the field of Information Systems. In the 1992, they proposed the Information Systems Success Model, which has become the most widely cited and used model in the field. The proposed model by DeLone and McLean (1992) regarding the Information Systems' success, has given a vital influence to the literature of Information Systems' measurement. According to Ballantine et al. (1996), the DeLone and McLean's (1992) Information Systems success model has been grounded originally in both studies proposed by Shannon and Weaver (1949) and Mason (1978). Moreover, DeLone and McLean (1992) based their work on a large number of previous studies; the total number of studies were 180 academics' publications during the period 1981 to 1987. The novel approach of DeLone and McLean's (1992) model is that it is considered as the first study attempted to develop a broad Information Systems model and instrument on behalf of a specific context.

Another study by Gable et al. (2008) endeavoured to address the factors related to the success of Information Systems. Six main dimensions have been stated in the literature regarding this success based on the previous studies. Those six dimensions are systems quality, information quality, use, user satisfaction, individual impact and organisational impact. The following figure (3.4) demonstrates the correlation among them:

Figure 3.4: D&M IS Success Model (The Relationship among the Six Dimensions)



Source: (DeLone and McLean, 1992)

According to many scholars in the field of Information Systems (such as Seddon and Kiew, 1996; Ballantine et al., 1996; Myers et al., 1997; Seddon, 1997) the Information Systems success model by DeLone and McLean has added a wide contribution to the literature. They agreed that the proposed model by DeLone and McLean (1992) helped to categorise the large number of Information Systems success measures that have been explained in the literature into six groups. Moreover, it helps the researchers to address the related stakeholders in the procedure of assessment. Finally, DeLone and McLean have illustrated the correlation among those six groups or categories in order to provide a model of "temporal and causal" interdependencies between these categories. However, Sabherwal et al. (2006) stated that in their study, the model has not been empirically examined or tested by DeLone and McLean (1992). Therefore, several studies have endeavoured to test, examine, adjust, improve and validate the Information Systems success model (Seddon and Kiew, 1996; Seddon, 1997; Rai et al., 2002; Sabherwal et al., 2006). Seddon and Kiew (1996) stated that the fundamental procedure of the Information Systems success model has been tested in order to expand the model and provide an alternative model if needed. In 1997, Seddon offered a substitute model of Information Systems by expanding and re-defining the DeLone and McLean (1992) proposed model. Additionally, other researchers in the field such as Rai et al. (2002) and Sabherwal et al. (2006) have developed the DeLone and McLean's (1992) model by adding extra items to it.

There is a big debate in the literature regarding DeLone and McLean's (1992) model. There is an argument by Seddon (1997) that the work of DeLone and McLean (1992) demonstrates an excessive and unnecessary combination between the procedure and the causal clarification of Information Systems success; thus, the DeLone and McLean's (1992) model is tangled and not specific. According to Sabherwal et al. (2006), the work of Seddon (1997) is essential in order to develop and get a better understanding of the DeLone and McLean's (1992) model. This is because the study by Seddon (1997) addresses the differences between the actual influence and the expected effect. Moreover, Seddon has included the extra group, which is perceived usefulness. Therefore, a theoretical approach has been adopted in order to adjust the DeLone and McLean's (1992) Information Systems success model. The work of Seddon (1997) contended that assisting users to increase and improve or take less time to achieve their work with a high quality could be provided by effective and successful systems. Therefore, Seddon (1997, p. 243) aimed in his study on the individual effect, which can be defined as "*the effect of information on the behaviour of the recipient of all the measures of Information Systems success*". Another definition for the individual impact has been mentioned in the study by Gable et al. (2008, p. 389) as the "*measure of the extent to which the Information Systems have influenced the capabilities and effectiveness, on behalf of the organisation of key users*". So, why the individual impact is important, according to DeLone and McLean (1992), is for several reasons that explain the significance of the individual impact:

- The impact term is strongly linked to the term of performance.
- The impact term works for Information Systems as a sign for the level the user understands, particularly of decision context.
- The impact term could be a sign of the users' decision-making improvement and efficiency.

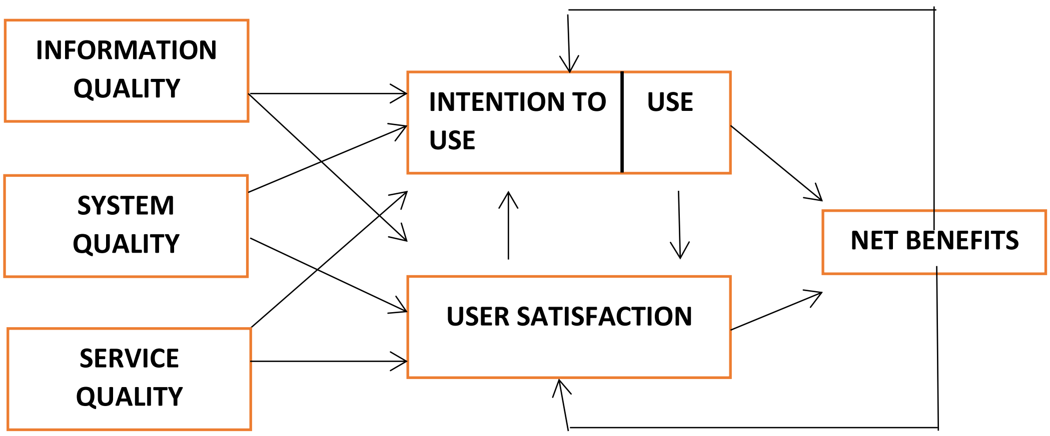
- The impact term could be a sign about a change in the user's action or decision maker's view of the importance or usefulness of the Information Systems. Additionally, Seddon (1997) assumed that usefulness is the level to which a person believes that job performance can be improved by using a specific system.

Another argument has been found in the literature by several researchers and scholars regarding to the DeLone and McLean's Information Systems success model, and that is that the service quality has been unnoticed by DeLone and McLean (1992). Pitt et al. (1995) recommended expanding the DeLone and McLean's model in order to reflect the Information Systems department's service role by adding the service quality construct as a measure of Information Systems success. Petter et al. (2008) agreed that there are many researchers who have recommended integrating the service quality to the existing model, because it is prominent to the Information Systems success. However, the main theory of the DeLone and McLean's (1992) model is based on the communication only, which does not reflect the fact that Information Systems department in any organisation is providing products and also services. Moreover, Petter et al. (2008) stated in their study that if a researcher is not willing to include the service quality evaluation while measuring the Information Systems effectiveness, this would lead to insufficient and unsatisfactory results. Therefore, Petter, et al. (2008, p. 239) defined service quality as "*the quality of the support that systems users receive from the information Systems department and Information Technology support personnel*". Moreover, they suggested that service quality can be measured for Information Technology departments by linking users' expectation and users' perceptions of the Information Technology department.

By reviewing the literature during the period of 1986 to 1990, the researcher found two supporting views on the benefits of service quality. Conrath and Mignen (1990) stated that users' expectations and Information systems services play important roles in users' satisfaction. Similarity, Rushinek (1986) reported that users' satisfaction is significantly impacted according to fulfilled users' expectations for a system. Therefore, Pitt et al. (1995) suggested that by determining customer expectations and perceptions of performance level for a range of service attributes, this can lead to an evaluation of the service quality and the differences among users' expectations and perceptions of actual performance and which can be calculated and averaged across the service attributes.

In 2003, DeLone and McLean reviewed more than 100 articles in the literature regarding their proposed model in 1992. They assessed and classified the arguments that had been highlighted by many researchers about the shortcomings of their model in order to update the Information Systems success model (DeLone and McLean, 2003). As a result, they found that the big argument was about service quality; therefore, they proposed an updated model, which includes six dimensions: systems quality, information quality, service quality, use, user satisfaction and net benefits. The updated DeLone and McLean's (2003) Information Systems success model is illustrated in the following figure (3.5):

Figure 3.5: Updated D&M IS Success Model

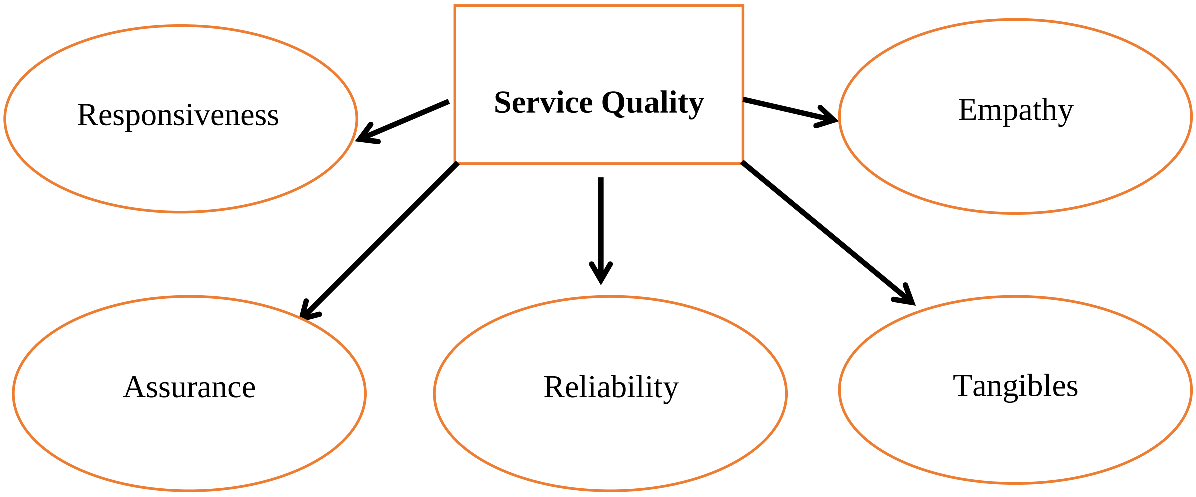


Source: (DeLone and McLean, 2003).

Subsequently, many studies have been published regarding the updated Information Systems success model proposed by DeLone and McLean (2003) (such as Sedera and Gable, 2004; Yusuf et al., 2004; Yeh et al., 2007; Chang et al., 2007; Gorla et al., 2010). Petter et al. (2013) clarified the value of the updated model; moreover, they assessed the usefulness of the updated model in line with dramatic changes in Information Systems practice. Indeed, they focused more on the significant development of E-commerce and how the Information Systems have played an important role in E-commerce evolution. Other studies (such as Petter et al., 2012; Althonayan, 2013; Lamb et al., 2014) stated that service quality is an essential dimension of Information Systems success measurement. This has been derived from the relationship that service quality provides among the different stakeholders' expectations of service quality and the degree of performance. Thus, they have declared that bearing in mind the service quality dimension for determining the different stakeholders' performance in the field of Information

Systems/ERP systems, particularly in the universities' context, is considered as critical and necessary. The following figure (3.6) shows the factors that have been included in the service quality dimension:

Figure 3.6: The Service Quality Factors in the Updated DeLone and McLean model



Source: (DeLone and McLean, 2003).

Sedera and Gable (2004), attempted to develop a unique instrument in order to measure the success of enterprise systems. To achieve their goal, they adopted the research cycle work from two studies presented by Mackenzie and House (1979) and McGrath (1979). Both of these studies involved two key phases: 'exploratory' and 'confirmatory'. Sedera and Gable (2004) confirmed the actuality of the four distinguished and individually important dimensions of ERP systems. Those dimensions are individual impact, organisational impact, system quality and information quality. The following table (3.14) demonstrates the validated measures of enterprise systems success in detail:

Table 3.14: Validated Measures of Enterprise Systems' Success

System quality	Information quality	Individual impact	Organisational impact
*Ease of use *Ease of learning *User requirements *System features *System accuracy *Flexibility *Sophistication *Integration *Customization	*Availability *Usability *Understand ability *Relevance *Format *Conciseness	*Learning *Awareness/ Recall *Decision effectiveness *Individual productivity	*Organisational cost *Staff requirements *Cost reduction *Overall productivity *Improved outcomes/outputs *Increased capacity *E-government

Source: (Sedera and Gable, 2004)

A study by Chien and Tsaur (2007) modified the updated DeLone and McLean (2003) Information Systems model in order to implement their updated model into the ERP systems field. The finding of their study was that the highest essential success factors related to the systems quality, service quality and the information quality. A year later, Petter (2008) declared that in the adjusted model proposed by Sedera and Gable (2004), the instrument that has been used to assess Information Systems success, is unique and important. The justification for their statement is that the Sedera and Gable’s (2004) adjusted model has the ability to determine the multidimensional combination and the difficult nature/environment of Information Systems success by assessing the four dimensions of individual impact, organisational impact, system quality and information quality. Moreover, the instrument is powerful because it has been tested to certify its validity in the ERP systems context.

Additionally, other studies in the literature have used different tools linked to the ERP systems context. Bernroider (2008) examined the role of Information Technology governance in order to lead ERP systems to success. Bernroider (2008) used the updated model by DeLone and McLean (2003) to achieve the main objective of the study. It focused on end-users, technical, administration, and business and Information Technology management personnel as important social factors to investigate the ERP systems’ success in the post-implementation phase. The factors that have been chosen by Bernroider (2008) are all illustrated in the adopted model. However, an understanding of the notion of Information Systems success needed to be deepened; therefore, Ballantine et al. (1996) proposed a new model derived from the DeLone and McLean’s model (1992). As a result, the Information Systems success has been separated into three different levels in order to gain a better and deeper understanding of the Information Systems success concept. Those levels were: technical development, deployment to the user and delivery of business.

Other researchers have attempted to evaluate the effect of Information Systems in general and ERP systems in particular. Abugabah et al. (2010) proposed an integrated framework in order to assess the effect of Information Systems and ERP systems on end users’ productivity. They have adopted three models into their framework: Technology-Task Fit, Technology Acceptance Model and DeLone and McLean’s Information Systems success model. The study by Abugabah et al. (2010) attempted to explore the factors that affect the Information Systems/ERP systems end-users' productivity; however, they have used and focused on only two dimensions from the DeLone and McLean's model, which are service quality and information quality. Therefore, they could not explore more details regarding performance characteristics. A study by Rabaa`i and Gable (2009) attempted to expand DeLone and McLean's Information Systems success model in order to explain the existing situation of administrative systems as the main objective of their study and to assess the current practices in some Australian universities as case studies in order to measure the different administrative systems. The following table (3.15) summarises the key researchers who studied and investigated the service quality dimension and the factors, which related to it.

Table 3.15: Key Researchers who Studied and Investigated Service Quality Dimension

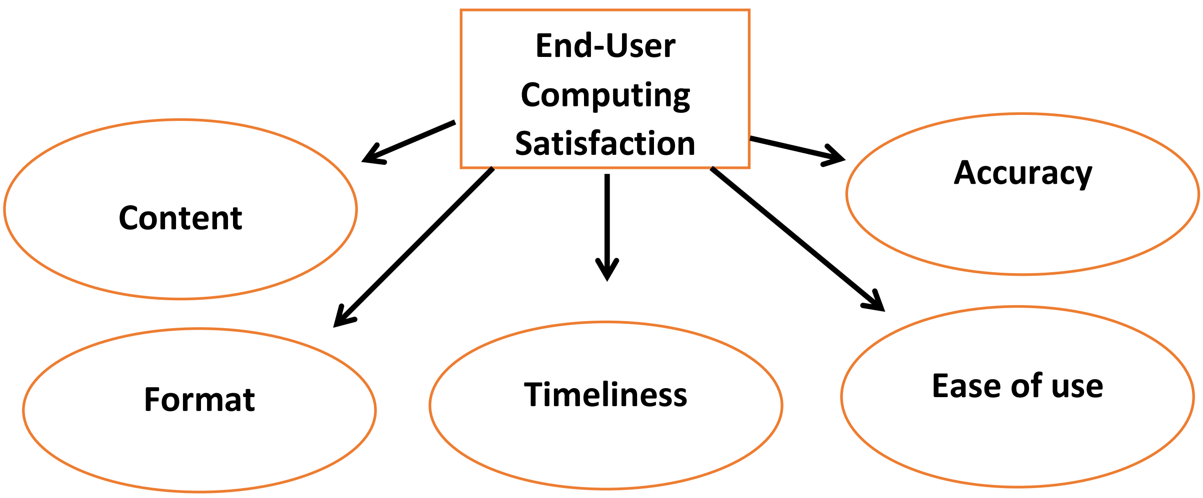
Authors' Names	Year	Dimension and factors	Method
Kettinger and Lee	**1994**	Tangible - Reliability - Responsiveness - Assurance - Empathy	Questionnaire
Pitt et al.	**1995**	Tangible – Reliability - Responsiveness - Assurance – Empathy	Questionnaire
Murphy and Simon	**2002**	Service Quality - Tangible	Case Study
Seddon et al.	**2002**	Service Quality	Survey
DeLone and McLean	**2003**	Tangible – Reliability - Responsiveness - Assurance – Empathy	Literature Review (update model)
Jun et al.	**2004**	Service Quality	Questionnaire
Landrum and Prybutok	**2004**	Service Quality	Survey
Sigala	**2004**	Tangible – Assurance - Empathy	Survey
Yusuf et al.	**2004**	Service Quality	Case Study
Pearson and Tadisina	**2005**	Empathy - Assurance - Reliability - Responsiveness	Email Survey
Parasuraman et al.	**2005**	Service Quality	Electronic Survey
Ahn et al.	**2005**	Service Quality	Survey
Kettinger and Lee	**2005**	Tangible - Reliability - Responsiveness - Assurance - Empathy	Questionnaire
Ray et al.	**2005**	Service Quality	Questionnaire
Nelson et al.	**2005**	Service Quality	Questionnaire
Genoulaz and Millet	**2006**	Service Quality	Experiments
Gupta and Kohli	**2006**	Service Quality	Literature Review
Yeh et al.	**2007**	Service Quality	Questionnaire
Chien and Tsaur	**2007**	Service Quality	Survey
Landrum et al.	**2007**	Tangible – Reliability - Responsiveness - Assurance – Empathy	Questionnaire
Lin	**2007**	Service Quality	Interviews
Chang et al.	**2008**	Service Quality	Survey
Au et al.	**2008**	Service Quality	Survey

Longinidis and Gotzamani	**2009**	Service Quality	Questionnaire and interview
Petter and McLean	**2009**	Service Quality	Literature Review
Abugabah and Sanzogni	**2010**	Service Quality	Survey
Kronbichler et al.	**2010**	System Quality	Literature Review
Gorla et al.	**2010**	Service Quality	Electronic Survey
Petter et al.	**2013**	Service Quality	Literature Review
Lamb et al.	**2014**	Service Quality	Literature Review

3.7.2 End-user Computing Satisfaction Model

The End-user Computing Satisfaction (EUCS) model has been proposed by Doll and Torkzadeh (1988) in order to measure the direct interaction between users and systems to enter the required information and arrange/organise the output report, which can be used to help and assist decision makers. The finding of the EUCS model was that once the outputs of the systems reach the users' expectation and requirements, this will positively influence and enhance the decision-making. Therefore, Doll and Torkzadeh (1989) declared that the EUCS model is vital regarding the actual attitude to a particular system and the direct user who interacted with it. The EUCS model includes five main factors: content, format, timeliness, ease of use and accuracy. The following figure (3.7) illustrates the five EUCS factors:

Figure 3.7: End-user Computing Satisfaction model



Source: (Doll and Torkzadeh, 1989).

Since the EUCS model is considered as an important measurement for the direct interaction between users and systems, therefore, the five factors, which have been driven by the model, are important for the Information Systems/ERP systems measurement (Althonayan and Papazafeiropoulou, 2013). However, the EUCS was focused on a traditional computing environment, which led to user performance being ignored. Doll and Torkzadeh (1991) clarified another reason for excluding performance. This reason has been supported by the study of Amoli and Farhoomand (1996), suggesting the performance, which is related to specific behaviours, will struggle to improve and provide a general and wider measures for EUCS success.

Doll and Torkzadeh (1991) extended their study in 1988 by examining the reliability of the EUCS instrument through evaluating both long and short-term constancy of 12 items that have the ability to measure the end user computing satisfaction. The finding of their result was that all 12 items have confirmed its constancy in both the long and short term. Five years after the work of Doll and Torkzadeh (1991), a study by Amoli and Farhoomand (1996) endeavoured to investigate the correlation between EUCS and user performance using structural model techniques. In order to achieve this objective, they produced twenty-seven items to explore the unknown relationship.

Several studies in the literature have adopted the EUCS model in the context of ERP systems. Somers et al. (2003) attempted to measure the end user satisfaction in the ERP systems context; thus, they adopted the EUCS model to reach their main goal. Moreover, they attempted to investigate several issues such as the theoretical meaning, structure, dimensionality, reliability and finally the validity of the EUCS model while using the implemented ERP systems. The result of their study declared and confirmed that the EUCS model can be used as a consistent measure for advanced Information Technology such as Information Systems and ERP systems. A study by Haab and Surry (2009) acknowledged several modes of participation in the implementation phase of ERP systems by measuring the correlation between the several modes of participation and the level of satisfaction with the ERP systems' implementation within the universities' context. In order to achieve their objective they adopted the EUCS model; however, they adjusted the adopted model to fit the context of their study. The following table (3.16) summarises the key researchers who studied and investigated the system quality dimension and the factors, which related to the EUCS model.

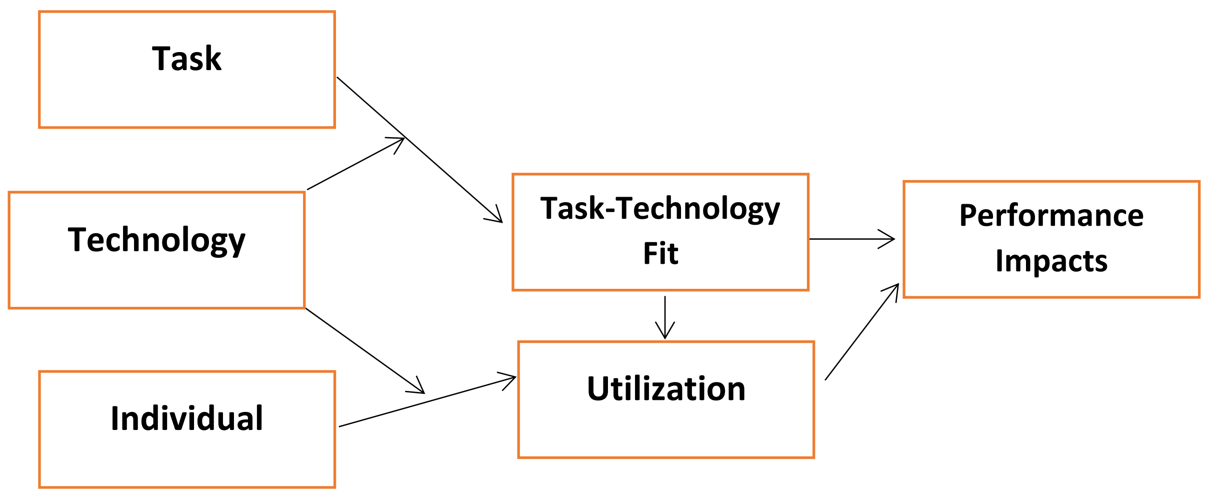
Table 3.16: Key Researchers who Studied and Investigated System Quality Dimension and Factors, which related to EUCS			
Authors' Names	**Year**	**Dimension and factors**	**Method**
Seddon and Kiew	**1996**	System Quality	Questionnaire
Amoli and Farhoomand	**1996**	Systems Quality (EUCS)	Questionnaire
Soh et al.	**2000**	Format - Content	Literature Review
Rai et al.	**2002**	Content – Format – Timeliness	Questionnaire
Somers et al.	**2003**	Content – Format – Timeliness	Mail survey
DeLone and McLean	**2003**	System Quality	Literature Review (Update Model)
McGill and Hobbs	**2003**	Format – Timeliness – Content	Experiment
Zviran	**2003**	Format – Timeliness – Content	Survey
Sedera et al.	**2004**	Format – Timeliness – Content	Survey
Doll et al.	**2004**	Format – Timeliness – Content	Survey
Zhang et al.	**2005**	System quality – Timeliness	Interview
Zviran et al.	**2005**	Format – Timeliness – Content	Questionnaire
Ahn et al.	**2005**	System Quality	Survey
Nelson, et al.	**2005**	Format – System Quality – Timeliness	Questionnaire
Wang and Chen	**2006**	System Quality	Survey
Kositanurit et al.	**2006**	Content – Format – Timeliness	Survey
Ifinedo and Nahar	**2006a**	System Quality	Survey
Wu et al.	**2007**	Technical factors (EUCS)	Case Study
Chien and Tsaur	**2007**	Systems Quality	Survey
Law and Ngai	**2007**	Content – Format – Timeliness	Questionnaire and Interview
Chang, et al.	**2008**	Social factors (EUCS) compatibility	Questionnaire
Wei	**2008**	Timeliness	Survey
Gable et al.	**2008**	Format – Timeliness – Content	Survey
Kerimoglu et al.	**2008**	System Quality	Questionnaire
Abugabah et al.	**2009**	Format – Timeliness	Literature Review
Abugabah and Sanzogni	**2009**	Timeliness - Content	Literature Review
Longinidis and Gotzamani	**2009**	Timeliness - Format	Questionnaire and interview
Kronbichler et al.	**2010**	System Quality	Comprehensive Literature Review
Yen et al.	**2010**	System Quality	Questionnaire
Gorla et al.	**2010**	System Quality	Electronic survey
Aggelidis and Chatzoglou	**2012**	System Quality - Timeliness	Survey
Nizamani et al.	**2014**	System Quality	Electronic survey
Aljohani et al.	**2015**	Timeliness – Content – Format	Interview
Abugabah et al.	**2015**	Timeliness - Content	Survey

3.7.3 Task-Technology Fit Model

This model can be considered as one of the most important models in the Information Systems/ERP systems field. Task-Technology Fit (TTF) has been defined by Goodhue (1995, p. 1829) as *"the extent that technology functionality* *matches task requirements and individual abilities".* Another definition for the TTF has been produced by Goodhue and Thompson (1995, p. 216) as *"the degree to which a technology assists an individual in performing his or her portfolio of tasks"*. According to Dishaw and Strong (1999), the main reason behind using Information Systems is so the existing end user functions meet the users' requirements and activities. The basic TTF model has been adopted from the work of Dishaw and Strong (1999). In the first version of the model the actual tool used has not been added; this is because Dishaw and Strong (1999) did not include the users' behaviour in their study. Therefore, based on the statement of Goodhue (1995), including individual abilities such as computer literacy and experience are very important factors; thus, Dishaw et al. (2002) updated their TTF model by adding the computer self-efficacy factor.

In the study of Chang (2008), the TTF model has been defined as the degree of the technology abilities to reach the demand of each task. According to Dishaw et. al, (2002) the task characteristics and the individual characteristics both have important effects on the task-technology fit construct, which will affect the result either utilization or performance. However, Goodhue et al. (2000) believe that the third construct, which is technology characteristics, play an essential role together with the other two constructs, "task characteristics" and "individual characteristics" upon performance impact. The following figure (3.8) demonstrates the TTF model:

Figure 3.8: The Model of Task-Technology Fit

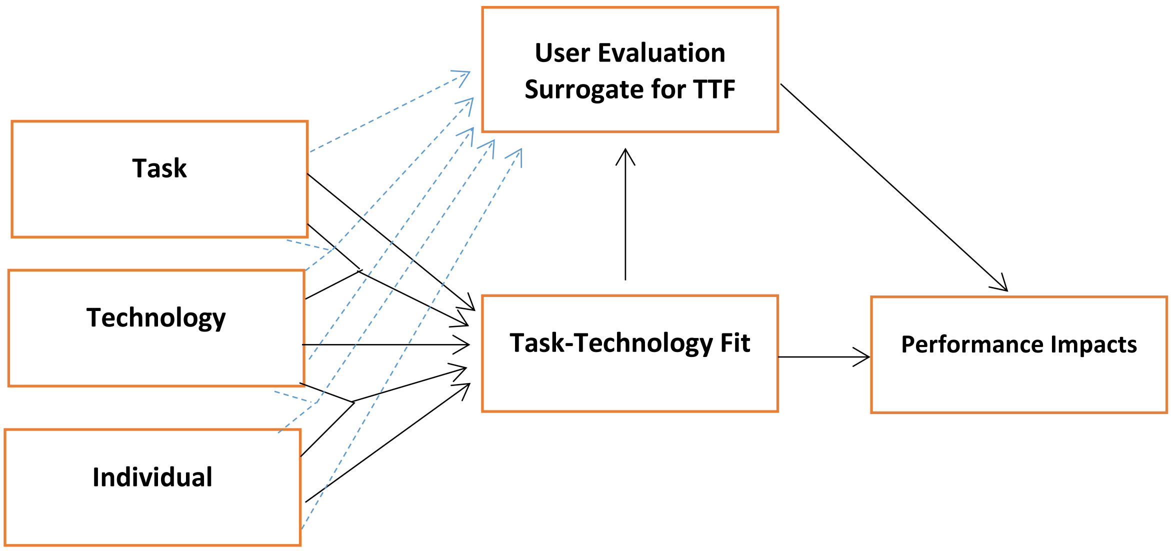


Source: *(*Goodhue and Thompson, 1995).

According to Goodhue (1995), measuring the success of Information Systems is problematic; therefore, many scholars in the field of Information Systems have considered users' assessment as a substitute in order to measure the Information

Systems' success. Therefore, the only way to assess the success in the case of Information Systems will be through its users. The following figure (3.9) demonstrates how users can evaluate Information Systems' success:

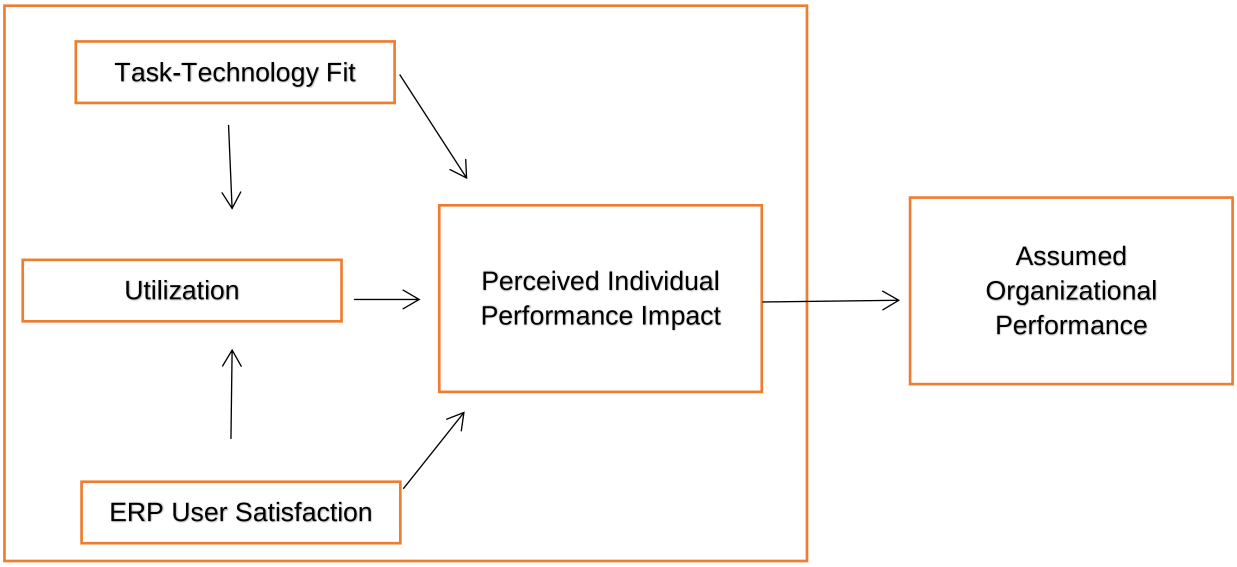
Figure 3.9: The Model of Task-Technology Fit and Users' Assessment



Source: (Goodhue, 1995).

In the study of Goodhue and Thompson (1995), they agreed that better performance can be achieved by continuous use only when there is task-technology fit. Therefore, Goodhue (1998) stated that positive user assessment and positive impact on performance could be linked to the level of correspondence between Information Systems functionality and task requirements. Goodhue and Thompson (1995) provided the Technology-to-Performance Chain (TPC) model in order to determine the relationship between Information technology and individual performance. The TPC model works in line with user attitudes as predictors of utilization and task-technology fit as predictor of performance. The finding of the provided TPC model was that if the technology has been well used and is appropriate with the tasks, it would support the individual performance, which will be positively affected. However, in the study by Kositanurit et al. (2006), intended to investigate the factors that affect individual performance in the context of ERP systems, the nominated factors that could affect the individual performance in ERP systems context are as follows, as illustrated in the following figure (3.10):

Figure 3.10: A Structural Model of TTF, ERP User Satisfaction, and Individual Performance Impact



Source: (Kositanurit et al., 2006).

Based on the statement made by Goodhue and Thompson (1995), organisational performance depends on individuals' task accomplishments. Therefore, Kositanurit et al. (2006) have examined a structural model of task–technology fit, ERP user satisfaction, and individual performance in ERP systems environments. The main finding of their study declared that the TTF model is unable to address the Information Systems characteristics/variables that lead to the highest levels of user performance, thus, their final recommendation was to integrate the TTF model with other models in order to solve the problem.

Several studies have attempted to integrate the TTF model with others. Dishaw and Strong (1999) conducted a study to integrate the TTF model with the Technology Acceptance Model (TAM) in order to provide a theoretical basis for exploring the factors that explain software utilization and its link with user performance. In 2002, Dishaw et al. expanded their previous study by examining the correlation between computer self-efficacy and the two integrated models, TTF and TAM (Dishaw et al., 2002). Additionally, Dishaw et al. (2004) conducted another study to integrate the TTF model with unified theory of acceptance and use of technology. In addition, there are other researchers who have attempted to integrate the TTF model with one or more models in order to achieve their researches objectives. Gros et al. (2005) supported the integration between the TTF model and other models; moreover, they have stated that it is very important to consider how systems could benefit or disturb the different end users. However, taking the TTF model by itself is not adequate to clarify the system's success or system users' satisfaction. The following table (3.17) summarises the key researchers who studied and investigated the system quality dimension and the factors, which related to the TTF model.

Table 3.17: Key Researchers who Studied and Investigated the System Quality Dimension and Factors, which related to TTF

Authors' Names	Year	Dimension and factors	Method
Goodhue and Thompson	**1995**	Task-Technology Fit	Questionnaires
Igbaria and Tan	**1997**	System Quality	Mail Survey
Goodhue	**1998**	Task-Technology Fit	Questionnaire
Dishaw and Strong	**1999**	Task-Technology Fit	questionnaire
Goodhue et al.	**2000**	Task-Technology Fit - Training	Questionnaire
Murthy and Kerr	**2000**	Task-Technology Fit	Experiment
Schubart and Einbinder	**2000**	Compatibility - System Quality	Questionnaire
Rai et al.	**2002**	Accuracy - Ease of use	Questionnaire
Adelakun and Jennex	**2002**	Task-Technology Fit	Interview and Survey
Dishaw et al.	**2002**	Task-Technology Fit - Ease of use	Survey
Liao and Cheung	**2002**	System Quality	Survey
Lowry	**2002**	Compatibility - System Quality	Questionnaire
Zhang et al.	**2003**	Training - Compatibility - Accuracy	Survey
Somers et al.	**2003**	Ease of use -Accuracy	Mail Survey
Klaus et al.	**2003**	Task-Technology Fit	Survey
O'cass and Fenech	**2003**	Compatibility - System Quality	Survey
Jun et al.	**2004**	Ease of use – Accessibility	Questionnaire
Lorenzo	**2004**	Technical Issues – Task-Technology Fit	Comprehensive Literature Review
Sedera et al.	**2004**	Ease of use - Accuracy - Flexibility - Currency - Accessibility	Survey
Calisir and Calisir	**2004**	Compatibility - Ease of use - Flexibility	Survey
Staples and Seddon	**2004**	Task-Technology Fit	Survey
Pearson and Tadisina	**2005**	Ease of use	Email Survey
Zhang et al.	**2005**	Training - Accuracy	Interview
Holsapple et al.	**2005**	Task-Technology Fit - Compatibility	Questionnaire
Wixom and Todd	**2005**	Ease of use - Compatibility - System Quality	Survey
Kositanurit, et al.	**2006**	Currency - Accuracy - Ease of use - Authorization	Survey
Wang and Huang	**2006**	System Quality - Authorisation – Accessibility	Survey
Wu et al.	**2007**	Task-Technology Fit	Case Study
Ifinedo and Nahar	**2007**	Accurate - Flexibility - Easy to use	Survey
Wu and Wang	**2007**	Training – Accuracy - Flexibility - Ease of use	Questionnaire
Bradley and Lee	**2007**	Training - Ease of use	Survey

Guimaraes et al.	**2007**	System Quality - Ease of use - Compatibility - Currency	Survey
Lin	**2007**	System quality	Interviews
Chang et al.	**2008**	Compatibility	Questionnaire
Bryson et al.	**2008**	Task-Technology Fit	Survey
Wei	**2008**	Flexibility - System Quality	Survey
Gable et al.	**2008**	Ease of use – Accuracy – Flexibility – Currency – Accessibility	Survey
Au et al.	**2008**	Accuracy – Accessibility - Flexibility	Survey
Chang	**2008**	Task-Technology Fit	Online Survey
Abugabah et al.	**2009**	Compatibility - Training - Assistance - Accuracy - Ease of use - Currency - Flexibility - Accessibility.	Comprehensive Literature Review (Proposed Model)
Abugabah and Sanzogni.	**2009**	Compatibility - Training - Assistance, Accuracy - Ease of use - Accessibility	Comprehensive Literature Review (Proposed Model)
Longinidis and Gotzamani	**2009**	Training – Accuracy – Ease of use	Questionnaire and Interview
Lin and Ha	**2009**	Training - Ease of use – Accessibility	Survey
Abugabah and Sanzogni	**2010**	Task-Technology Fit - Compatibility - System Quality	Survey
Abugabah et al.	**2010**	Task-Technology Fit - Ease of use	Questionnaire
Muhammad et al.	**2013**	Task-Technology Fit	Multi-Case Study
Ali and Younes	**2013**	Task-Technology Fit - Ease of use	Survey
Ononiwu	**2013**	Task-Technology Fit	Questionnaire
Abugabah et al.	**2013**	Task-Technology Fit - Ease of use	Questionnaire
Pishdad and Haider	**2013**	Flexibility – Compatibility - Training	Integrative Framework
Zubair and Zamani	**2014**	Training Issues - Technical Issues	Case Study of A Saudi University
Sun and Mouakket	**2015**	System Quality	Questionnaire
Shaikh and Karjaluoto	**2015**	System Quality - Ease of use	Literature review
Mahanga and Seymour	**2015**	Task-Technology Fit	Literature review
Toni et al.	**2015**	Task-Technology Fit	Interview and Questionnaire
Abugabah et al.	**2015**	Compatibility - Training – Accuracy - Accessibility	Survey

3.8 The Current Study's Adapted Framework

Based on the above discussion, the great efforts by researchers and scholars over the past two decades in attempting to generate, develop and propose a reliable and valid measure for Information Systems and ERP systems success can be clearly seen. Torkzadeh et al. (2005) declared that success measures have two aims: the first aim is user behaviour and the second aim is decision outcome. Success measures emphasise these two aims rather than what users consider value in a system, which related to how it supports them to reach their objectives. Therefore, Abugabah et al. (2009b) reviewed the previous Information Systems studies that have been published by other researchers and scholars in order to explore the factors that cause the highest impact on users' performance and efficiency, based on the statement and the finding of Torkzadeh et al. (2005). In their study, they integrated three existing models: the Technology Acceptance Model, Technology-Task Fit Model and DeLone and McLean's Information Success Model. One of their contributions was that notwithstanding the significance of the three chosen models, by implementing those models as a separate entity or in other words not integrated together, this would only provide unreliable and weak results. Thus, they claimed that the three chosen models do not have the important variables, so they recommend linking the three models together; moreover, associated variables regarding technology, systems and human aspects have to be added simultaneously. Therefore, Althonayan and Papazafeiropoulou (2013) proposed a framework has included different variables from three validated models in the field of Information System/ERP systems. These models are DeLone and McLean's Information Success Model, Task-Technology Fit Model and End-User computing Satisfaction Model. The following table (3.18) shows the factors that have been nominated by Althonayan and Papazafeiropoulou from the three above-mentioned models:

Table 3.18: The Factors of the Initial Framework

Performance	Systems Quality		Service Quality
D&M ISS	**TTF**	**EUCS**	**D&M ISS**
-Time taken to complete task -Improve stakeholders' productivity -Immediate recall of information -Stakeholders' confidence and performance - Ability to identify problem and solutions - Computer awareness	-Lack of confusion -Right data -Accessibility -Assistance -Authorization -Ease of use -Flexibility -Training -Accuracy -Compatibility -Currency	-Content -Format -Timeliness	-Reliability -Assurance -Responsiveness -Tangible

Source: (Althonayan and Papazafeiropoulou, 2013).

This section explains in detail the proposed framework of Althonayan and Papazafeiropoulou (2013). They have nominated two dimensions from the DeLone and McLean's Information Systems success model; the first dimension selected is that of individual impact from DeLone and McLean’s IS success model (1992), and the second dimension that has been added to the framework is the service quality impact from the updated DeLone and McLean’s Information Systems success model (2003). Their justification for selecting these two dimensions is that both of them have the ability to explore if ERP systems have any effect on the different end users’ performance and explain how ERP systems can satisfy the requirements of its different users. Moreover, the selected factors from the TTF model and EUCS model have been justified in that the TTF and the EUCS model have included the most appropriate factors in the nature of ERP systems and they have the ability to measure or claim how ERP systems improve/enrich individual performance. Therefore, they have suggested that if factors from both models were joined together, that would assist in appraising performance from a technical viewpoint.

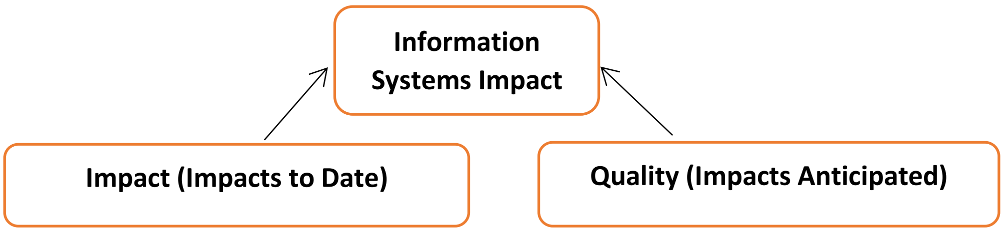
However, the proposed framework has eliminated some factors from the TTF model based on the statement of Goodhue (1998), two factors, which are presentation and level of detail, could be ignored because they have a similar purpose as two other factors in the EUCS model, such as format and content. Moreover, according to Althonayan and Papazafeiropoulou (2013), the locatability and meaning factors are not related to ERP systems assessment from the perspective of the different users’ performance. Indeed their statement is based on the argument of Goodhue (1998) that the TTF model has been proposed in order to assess systems and services related to the Information Systems department, whereas, the individual applications is the main aim and concern for the EUCS model.

The five factors that have been selected in the proposed framework above are: time taken to complete task; improved stakeholders’ productivity; immediate recall of information; stakeholders’ confidence and performance; ability to identify problems and solutions and finally computer awareness. All of them are originally conducted in the work of DeLone and McLean (1992); moreover, all of them are related to the individual impact dimension (Althonayan and Papazafeiropoulou, 2013). Computer awareness plays an important role in determining the understanding of systems by its different stakeholders, because better understanding of the systems by its individual users leads to a better performance.

Additionally, the importance of the service quality factors, which have been suggested in the updated Information Systems success model by DeLone and McLean (2003) is to assure the quality of the support, which is provided by Information Technology department to the ERP systems users and how that could impact their individual performance (Althonayan and Papazafeiropoulou, 2013). To make it clearer, TTF and EUCS models have the ability to assess the technical aspects of ERP systems while the dimension of individual impact, which is derived from the DeLone and McLean 's (1992) model has the ability to focus on the human/social aspects. Therefore, the three models have been selected in the adapted framework, which can offer actual and effective appraisal of the different stakeholders' performance. Moreover, the integration of the three widely used models will demonstrate an efficient assessment for the different users' performance (Althonayan and Papazafeiropoulou, 2013).

The importance of the adapted framework comes from the increasing need for development of a measure that has special features such as easy to implement and easy to understand; moreover, any system has to have a basis of measurement that is easy to administer and clearly cost effective (Myers et al., 1997). The second advantage of the adapted framework for the current study is that the previous studies have given rise to the dimension of the Information Systems success model along with the contingency framework, which have been developed by Saunders and Jones (1992). Nevertheless, those previous studies have only recommended the factors that should be added to assess the Information Systems and ignored the technique to apply them, which has been explained in the adapted framework. The third advantage is based on a statement by Gable et al. (2008). They have claimed that using a holistic measure in order to assess Information Systems, it should contain dimensions that are related to the backward impact, net benefits and forward quality, based on their opinion that this will lead to the provision of the best surrogate measure of possible forthcoming impact. The following figure (3.11) shows how the mixture of impact and quality signifies a comprehensive measure of the information system:

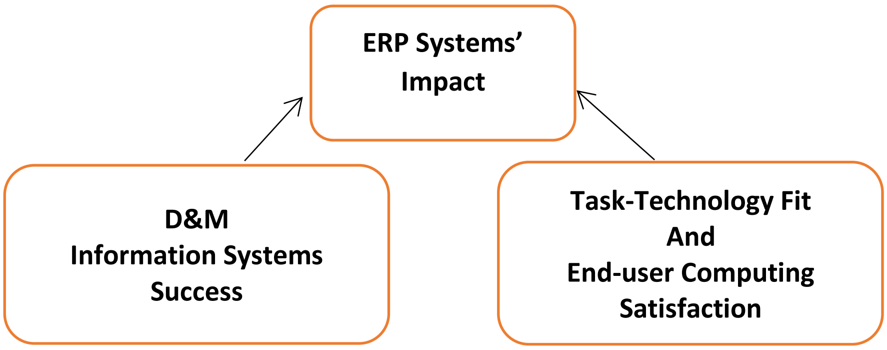
Figure 3.11: The Combination of Impact and Quality



Source: (Gable et al., 2008).

The fourth benefit of the adapted framework is that the integrated three models will cover the weaknesses of each model based on the work of Gable et al. (2008) by combining the impact and the quality together, which will help to develop a new model, which includes the most important factors that affect the different users' performance. The following figure (3.12) illustrates the ERP systems' impact:

Figure 3.12: ERP systems' Impact



Source: (Althonayan and Papazafeiropoulou, 2013 from the work of Gable et al., 2008).

The fifth advantage is based on the statement of Farbey et al. (1993), that it is essential to follow a framework for two reasons: the framework helps to systematise/arrange the list of benefits and the second is that the framework provides a guideline to the researcher. Therefore, the selected factors from DeLone and McLean's (1992) Information Systems success model are applied to measure impact, whereas the other factors have been selected from the TTF and EUCS models in the framework to measure quality and to assess the different users' performance particularly academic staff's performance. The next benefit is that the adapted framework focuses on both technical and social/individual performance. Althonayan and Papazafeiropoulou (2013) declared that the individual performance is an important measure of overall organisational performance. Therefore, to investigate the impact of ERP systems for the different users' performance is an important technique to evaluate the usefulness and value of the implemented ERP systems particularly in the universities' context. Moreover, the adapted framework will address the influence of users' performance that has been affected by the implemented ERP systems. The last advantage is that the selected factors that have been chosen to examine their effect on the satisfaction of Information Systems and ERP systems users, have been validated by many researchers and scholars in several studies in the literature particularly in the Information Systems/ERP systems field.

Based on the above advantages, the researcher has adapted the framework, which has been developed by Althonayan and Papazafeiropoulou (2013), in order to highlight the most effective factors that have direct impact on academic staff's performance while they are using the implemented ERP systems in their universities. Therefore, this will help the researcher to achieve the main objective, which is developing a model that will demonstrate the ERP Systems factors that affect the academic staff's performance within the universities' context.

The above framework excluded one of the service quality dimensions, which is the empathy factor. Jiang et al. (2002) found high convergent validity for the reliability, responsiveness, assurance, and empathy of the service quality model (SERVQUAL) scales and found acceptable levels of reliability and discriminant validity among the reliability, responsiveness, and empathy scales. Moreover, many scholars have stated that the empathy factor of the service quality variable has received a highly validity and reliability as well as the other four factors (Landrum and Prybutok, 2004; Ma et al., 2005; Parasuraman et al., 2005; Landrum et al., 2007; Abugabah et al., 2009a; Abugabah et al., 2009b; Gorla et al., 2010; Tsai et al., 2011). Therefore, in the current study the empathy factor will be included in the framework and will be added in the service quality as demonstrated in Table (3.19) below and appendix 1, which presents the final design of the adapted initial framework for the current study:

Table 3.19: Factors From the Initial Framework + Empathy Factor

Performance	Systems Quality		Service Quality
D&M ISS	**TTF**	**EUCS**	**D&M ISS**
-Time taken to complete task -Improve stakeholders' productivity -Immediate recall of information -Stakeholders' confidence and performance - Ability to identify problem and solutions - Systems awareness	-Lack of confusion -Right data -Accessibility -Assistance -Authorization -Ease of use -Flexibility -Training -Accuracy -Compatibility -Currency	-Content -Format -Timeliness	-Reliability -Assurance -Responsiveness -Tangible **Empathy**

Source: Althonayan and Papazafeiropoulou (2013) and adjusted by the researcher.

3.9 Summary and Gaps in the Literature

The conclusion that can be drawn from the broad ERP literature is that the worldwide adoption of ERP Systems in Higher Education Institutions (HEIs) has received mixed reactions despite the growing popularity over the past decade. Despite the fact that the ERP literature has covered extensive mileage, its focus remains mostly unchanged. It highlights and describes specific success factors and failure rates of ERP systems. The literature also reveals that there is no consensus of views on ERP research and that many studies fall short of providing empirical evidence about the practical implications or failure rates. ERP research appears tends to be polarised between the critics who see ERP benefits rather limited and others who believe ERP is a multi-dimensional and complex system, which can successfully be implemented. Thus, previous literature shows conflicting even contradictory views regarding the most suitable approach to evaluate ERP systems from the different perspectives (technical, social, and individual). While, the main focus of previous studies was either on critical success factors and implementation issues and/or on user acceptance and satisfaction. This study takes the view that a holistic ERP approach and a one-size-fits-all model is unrealistic. ERP Systems are not a blue print and are not an IT solution but a system that would move the organisation towards greater efficiency and effectiveness. Successful implementation of ERP is closely interlinked to multiple factors that needs to be understood by management who are setting the strategic direction of the implementation process. Furthermore, continuous support and monitoring of the implementation process is required at each stage. The most important issue in a successful ERP project is an understanding of the organisational culture and the way business is conducted.

Though the barriers and high failure rate in implementing ERP systems within the universities' environment have been cited in the literature, research on critical success factors (CSFs) for ERP implementations in this context is rare and fragmented. The key issue, it seems is that the context of universities must take into account the ERP systems users' expectation to achieve the highest performance. It can also be seen from the literature that identifying the factors, which can affect the different users' performance in the universities' context, is necessary and may hold the answer that will help the universities' context to define the right approach. Whilst the significance of ERP systems internal and external contextual factors have been widely debated by researchers, the majority of the research is within the private sector with little research on the context of universities.

In the context of investigating ERP systems, most of the previous and current published research has been conducted in developed countries. However, in the developing countries, particularly Saudi Arabia, investigating the post-implementations of ERP systems' impact on universities' users is under-researched and the specific knowledge regarding the research problem is limited. There is no study, which has been conducted to investigate the ERP systems factors that affect the academic staff's performance in universities from their own perceptions. Therefore, in order to address the current research gap, this study investigated the impact of ERP systems on academics' performance in the context of Saudi universities.

Finally, despite the importance of the development of ERP systems in universities context, however, technologies are growing rapidly fast. Therefore, continuance development and following the newly established innovations and systems such as Cloud-Based Integrated System and Intelligent Business Systems will be beneficial for universities' context to be updated with new systems and technologies that can be implemented in order to cope up with the advanced universities around the world.

CHAPTER FOUR: RESEARCH METHODOLOGY AND METHODS

4.1 Introduction

This chapter discusses the research methodology and methods adopted by this study. It describes how the data required will be obtained and what type of data will be necessary to achieve the research objectives. It will also justify the data collection instruments used for this research such as questionnaires and semi-structured interviews. It also aims to discuss the various research philosophies, approaches, strategies and methods. It will explain the motivation behind the methodological choices made in this study, which are shaped by the literature review and linked to the research objectives formulated by this study. In addition, this chapter will consider the type and nature of sampling and validity and reliability of the methods of analysis employed to address the aim and objectives of the research. It will highlight the reliability and validity statistical tests and finally the Structural Equation Modelling (SEM) technique, which will be used to analyse the quantitative collected data.

The field of Information Systems is considered as multidisciplinary including the likes of decision-making, decision support systems, intelligent systems and enterprise resource planning systems. Therefore, selecting the most appropriate method and methodology that fit the nature of the Information Systems field is difficult. According to Mathiassen (2002) the complexity in choosing the suitable methods have provided a valuable discussion regarding the different approaches and methods that can be applied to Information Systems.

4.2 Revisiting the Research Objectives of this Study

Thus, in order to put things in perspective and to ascertain how the methodology and methods fit within the broad aim of this research, it is worth restating the research objectives of this study. The main focus in the current research is to examine the ERP systems' impact on the academic staff's performance in the context of Saudi universities. The adoption of ERP applications has been viewed as one of the most innovative developments (Al-Mashari, 2002) and the purpose of which is to optimise business process functionality and integrate major business functions (Koch, 2003) to enhance the performance of academics. In short, the aim of the study is to suggest a strategic ERP model based on the findings of this study in order to stimulate and drive the academics' performance within universities' context. Thus, this study aims to investigate the impact of ERP systems on academics' performance in the context of Saudi universities and in order to achieve this research the following objectives have been developed:

- To identify the current problems and challenges hindering the implementation of ERP within the Saudi universities' context as an example of a developing Middle Eastern country.
- To determine the factors influencing academics' performance while using ERP systems in the context of Saudi universities, as an example of a developing Middle Eastern country.
- To highlight any differences among the different groups of academics regarding their attitudes regarding their performance as a dependent variable while using ERP systems.
- To develop and test a model that portrays the critical factors, which significantly affect academics' performance while using the ERP systems for the context of Saudi universities from the perspective of academics' attitudes and perceptions.

4.3 The Purpose and Significance of Conducting Research

Research is conducted to gain knowledge based upon the methodological process of collecting and analysing information to enhance an understanding of a phenomenon under investigation. It aims to address a research question in order to generate and develop knowledge. Despite the fact that research is an essential part to both business and academic life, it is not clear-cut in the literature on how it should be defined. Research has become a label often used randomly to mean different things to different stakeholders. The nature and purpose of research itself is something that can have many different interpretations. Today's society is research-driven and the term research is frequently used, but not always in the correct way (Walliman, 2011). There is, however, a general agreement that research is a process of inquiry.

The main purpose of conducting research is to contribute to knowledge in a particular field. Walliman (2011) stresses that the overriding objective of research must be that of gaining beneficial and interesting knowledge. The objectives of research have been highliged as follows: "*Categorisation, explanation, prediction, creating a sense of understanding, providing potential for control, and evaluation*" (Ibid, p. 7).

Research has been defined by many researchers using different wording and labels to provide their own explanations and definitions of what the term research means. Saunders et al. (2016, p. 680) believe that research means *“the systematic collection and interpretation of information with a clear purpose, to find things out”.* In the same vein, Bryman (2012) points out that research is a systematic inquiry that helps a researcher to identify the issues that are to be addressed, decide on the objectives and finally draw conclusions on the basis of the data and their analysis. Furthermore, Ross (2012) states that research is a form of critical thinking that is motivated by internal, value laden agendas, while Robson and McCartan (2016) highlights three key features that distinguish research from other finding out activities: (i) sceptical thinking and critical review of existing knowledge; (ii) concerned with following a specific systematic process; and (iii) having ethical implications. In contrast, for Nunan (2006), research has three components: a question or a problem, data collection, and data analysis and interpretation. Research is an investigation to address a problem. Echoing the same line of thought, Mertens (2010, p. 2) claims that research is:

“a systematic investigation or inquiry whereby data are collected, analysed and interpreted in some way in an effort to understand, describe, predict or control an educational or psychological phenomenon or to empower individuals in such contexts”.

According to Saunders et al. (2016), research is concept, which can be defined as something that people want to increase their knowledge about it, so they use a systematic way to satisfy their curiosity about a specific phenomenon. The previous definition is similar to what Collis and Hussey (2013) call research as a method that can be used to explore or investigate a particular subject to determine the reality/truth of the examined subject.

4.4 Research Methodology and Methods

As a starting point, Saunders et al. (2016) state that a strong research design is very important in order to enhance the reliability of any research findings and results; moreover by selecting the most appropriate philosophical research approach, this would improve the logical process of the undertaken research idea.

Research methods and research methodology are two terms that are often confused and randomly used and often used interchangeably (Collis and Hussey, 2013).

Strictly speaking, they are different. According to Menacere (2016, p. 13), *“Clarity in research methodology is paramount. Usage of terms and concepts whose meaning is indeterminate or ambiguous complicates the task of selecting appropriate methods and achieving useful research findings to benefit others”.* One of the main differences between methodology and methods is that research methods are the tools/instruments used by the researcher to collect data on a phenomenon or a topic under investigation. In other words, methods consist of the different investigation techniques and data collection instruments such as questionnaires, interviews and focus groups. In contrast, methodology is the study of methods and deals with the philosophical assumptions underlying the research process. Easterby-Smith et al., (2013, p.18) distinguish methodology and methods as follows: *“methodology is a combination of techniques used to inquire into a specific situation while methods are individual techniques for data collection and analysis.”*

Likewise, Hussey and Hussey (1997, p. 54) define methodology as *“the overall approach to the research process, from the theoretical underpinning to the collection and analysis of data”*. Methodology thus refers to the interrelationship, which exists between theory, method, data and phenomena under investigation. It is a roadmap, which aims to systematically explain the research problem, the rationale behind it and how research is conducted scientifically. Research methodology is a strategy used for the purpose of gathering information that helps in answering the research questions and achieving the research objectives.

Both methodology and methods have a very important role on any conducted research. This view is supported by many scholars who stressed the importance and differences between the two research concepts. Kothari (2004) described the term methodology as the whole structure or system that a researcher has planned and adopted in order to control and manage his/her research steps. On the other hand, Kothari (2004) has described methods as the techniques or instruments adopted by a researcher in order to achieve the goal of his/her research. Collis and Hussey (2013) stated that notwithstanding the different kinds of methods, however, all of them have a similar aim, which is finding the appropriate solution to solve the researchers’ problems. Moreover, they have suggested that research methods are considered as the main tools to gather/collect any research data. In addition, Collis and Hussey (2013) stated a similar definition for the research methodology viewing it as the systematical and logical process that would allow a researcher to achieve and address the objectives and the raised research questions in his/her study.

According to Kothari (2004), both terms have to be well defined and addressed by any researcher. One of the most important pieces of advice given to any researcher is to select the most applicable methods to collect the research data. Moreover, the researcher has to adopt the most suitable methodology that fits his/her research aim, objectives, questions, area/field and provide some assumptions regarding the type of data that have to be collected for the research in order to adopt the methods, which support his/her research.

At the same time, in order to choose and adopt the most appropriate methodology, any researcher has to gain enough knowledge regarding the possible benefits that can be gained as well as the limitations of the methods that are required to find solutions for the raised problem (Eriksson and Kovalainen, 2008). Based on the above discussion, the two essential terms 'methodology' and 'methods' are linked to each other. Therefore, it is very important to understand both terms and how they could be applied in any study. Moreover, the methodology and methods would provide some hints for a researcher as to which philosophical assumptions should be followed in order to draw an overall picture in the researcher's mind regarding his/her research processes.

4.5 Research Philosophical Assumptions

The research methodology and methods textbooks stress that researchers need to understand philosophical assumptions before undertaking a particular research project. Research philosophy, can be defined as a framework that a researcher has to determine in order to guide his/her in how a systematic study should be directed (Saunders et al., 2016). There are many benefits that can be gained by choosing the most appropriate philosophical type regarding the research design. Those benefits according to Easterby-Smith et al. (2015) are as follows: (1) it will guide the researchers to simplify their research designs; (2) it might help the researchers to identify and develop different designs that are not from their current experiences; (3) it suggests to the researchers which designs are suitable to their studies and which designs are not. In addition, there are several scholars who have agreed on the vital importance of a research philosophy and its effect on research design and how both of them generally have an important role in the whole study/research (Collis and Hussey, 2013; Creswell, 2013; Easterby-Smith et al., 2015). Moreover, research design has an important role in exploring the problem of any research and establishing effective research methods to reach effective explanations to the raised questions (Kumar, 2005). However, due to lack of clarity of methodological terms used in the literature, Menacere (2016) points out that understanding the research philosophy underpinning a particular study enables the researcher to position their methodological perspective.

4.5.1 Ontology and Epistemology

Research is based on assumptions about how reality is perceived and how best it can be understood and interpreted. Epistemology and ontology constitute the theory of knowledge and view of reality. Ontology refers to the philosophical study of the nature of being or the nature of reality. Epistemology is the study of the nature of knowledge, and of how knowledge is gained from social entities. According to Easterby-Smith et al. (2015), the core argument between researchers and scholars in social science is over two main philosophical assumptions, which are ontology and epistemology. Ontology may be known as *“concerned with the nature of realities”* (Saunders et al., 2016, p. 110), while epistemology *“concerns what constitutes acceptable knowledge in a field of study”* (Ibid, p. 112). However, there are other assumptions which have been discussed by key scholars (such as Collis and Hussey, 2013; Easterby-Smith et al., 2015; Saunders et al., 2016). Those other assumptions that have been mentioned by the above scholars are axiological, rhetorical and methodological philosophies.

In the case of the ontological assumption, it can be defined as the actuality of the influences between people, society and the whole world. Therefore, ontology focuses on the existence of the reality under investigation (Eriksson and Kovalainen, 2008). On the other hand, the epistemological assumption focuses on two main things: what counts as knowledge and how this knowledge has been obtained (Ibid). In addition, philosophical assumptions have two aspects ‘objectivism’ and ‘subjectivism’; each aspect has characteristics that make it differ from the other aspect (Saunders et al., 2016). Regarding the ontological assumption, the objectivism aspect is reflecting that the reality of social entities are placed outside from the social actors, whereas in subjectivism, the reality of the social phenomena is reflected by the perceptions and actions of the social actors (Ibid). The epistemological assumption is considered as the nature of knowledge that has two main positions ‘positivism’ and ‘social constructionism’ (Easterby-Smith et al., 2015). Indeed, researchers and scholars (such as Burrell and Morgan, 1979; Collis and Hussey, 2013; Saunders et al., 2016) have used different terms for it in social constructionism. These different concepts are phenomenology, anti-positivism and interpretivism. The first position, which is positivism, determines the objectivism side of the epistemological assumption and it claims that observation is the only way to gain knowledge in order to allow a researcher to address and forecast what occurred in the social world by using hypotheses that seek for relationships among different events or factors that have been examined (Burrell and Morgan, 1979).

On the other hand, the second position, which is interpretivism, determines the subjectivism side of the epistemological assumption. Moreover, it claims that personal experiences are the only way to obtain knowledge. Therefore, a researcher has to be inside the problem environment to obtain the required research knowledge (Eriksson and Kovalainen, 2008). The following table (4.1) demonstrates the differences between the two positions 'Positivism' and 'Interpretivism' related to the epistemological assumption.

Table 4.1: Differences Between 'Positivism' and 'Interpretivism' in the Case of Epistemological Assumption.

Positivism	Interpretivism
Produces quantitative data	Produces qualitative data
Uses a large sample	Uses a small sample
Concerned with hypothesis testing	Concerned with generating theories
Data is highly specific and precise	Data is rich and subjective
The location is artificial	The location is natural
Reliability is high	Reliability is low
Validity is low	Validity is high
Generalise from sample to population	Generalise from setting to another

Source: (Eriksson and Kovalainen, 2008).

While the main two philosophical assumptions have been discussed above, there are other assumptions as has been mentioned earlier. According to Saunders et al. (2016), the axiology assumption reflects the position of the researcher in terms of the role of values, whether his/her views are free or laden. So, if the researcher has free views in term of the role of values, that will lead him/her to be more positivist. However, if the researcher has a laden view in terms of the role of values, that will make the researcher more biased and subjective. The following table (4.2) summarises the different types of philosophical assumptions that relate to the characteristics of the two positions:

Table 4.2: Summary of the Different Philosophical Assumptions		
Positions / Assumptions	Objectivism	Subjectivism
Ontological **"What is the nature of reality?"**	Social reality is objective and external to the researcher. There is only one reality	Social reality is subjective and socially constructed. There are multiple realities
Epistemological **"What is the relationship between the researcher and the conducted research?"**	Knowledge comes from objective evidence about observable and measureable phenomena. The researcher is distant from phenomena under study	Knowledge comes from subjective evidence from participants. The researcher interacts with phenomena under study.
Axiological **"What is the role of values?"**	The researcher is independent from phenomena under study. The results are unbiased and value-free	The researcher acknowledges that the research is subjective. The findings are biased and value-laden
Rhetorical **"What is the language of research?"**	The researcher uses the passive voice, accepted quantitative words and set definitions	The researcher uses the personal voice, accepted qualitative terms and limited a priori definitions
Methodological **"What is the process of research?"**	The researcher takes a deductive approach. The researcher studies cause and effect, and uses a static design where categories are identified in advance. Generalisations lead to prediction, explanation and understanding. Results are accurate and reliable through validity and reliability.	The researcher takes an inductive approach. The researcher studies the topic within its context and uses an emerging design where categories are identified during the process. Patterns and/or theories are developed for understanding. Findings are accurate and reliable through verification.

Source: (Creswell, 2013; Collis and Hussey, 2013).

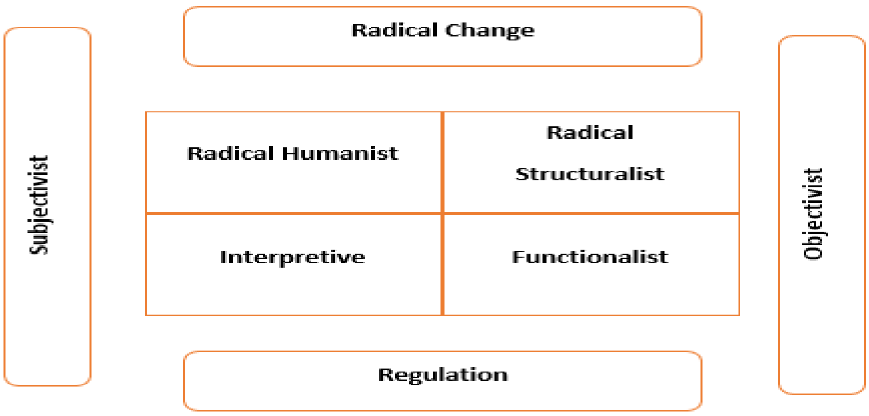
4.5.2 Research Paradigm and Research Philosophy

Research paradigm and research philosophy are terms that often cause misunderstanding. A good grasp of these two concepts is important to determine the underpinning assumptions for conducting a research study. Therefore, Menacere (2016) stated that the understanding of the research paradigm and research philosophy are a crucial part of the research process, as both will affect research findings and methods.

4.5.2.1 Research Paradigm

Guba and Lincoln (1994, p. 105) consider that a paradigm is the *"basic belief system or worldview that guides the investigator".* There are two different views in the literature regarding the paradigm and philosophy concepts. The first view uses the paradigm concept along with the philosophy concept as one concept (Saunders et al., 2016). The second view such as Collis and Hussey (2013) stated that the concept of paradigm could make real confusion for researchers. Morgan (2007) addressed the need to explain the term paradigm at the philosophical level then at the social level and finally at the technical level. Morgan (2007) indicates the three levels as: philosophical level, where people's beliefs about the world are considered in his/her research; the social level, where the position of a researcher is while they are conducting the research; and the technical level, where a researcher focuses to choose the most appropriate tools and techniques to collect and gather his/her research data. According to Saunders et al. (2016), the importance of the paradigm concept is to clarify the research philosophy. Therefore, they have adopted the four categories from the work of Burrell and Morgan (1979) in order to characterise the different fundamental approaches to research, which would allow a researcher to outline his/her research through different views. They have related the suggested paradigms to the nature of society in two main concepts, subjectivism and objectivism. The following figure (4.1) demonstrates the four different categories for research paradigms.

Figure 4.1: Four Paradigms for the Analysis of Social Theory



Source: (Burrell and Morgan, 1979).

The above figure shows two dimensions; the first one is the horizontal side of the matrix, which suits and reflects the ontological beliefs. However, the vertical side of the above matrix is concerned with the environment, particularly for radical change and regulation. The radical change aims to explain two things, manners of control and conflict that defines the society (Burrell and Morgan, 1979). On the other hand, the regulation explains how the organisational characteristics are delimited and controlled; moreover, it provides suggestions as to how those characteristics can be enhanced (Burrell and Morgan, 1979; Saunders et al., 2016).

The above four paradigms ‘radical humanist’, ‘radical structuralist’, ’interpretive’ and ‘functionalist’ have been explained by Saunders et al. (2016) as follows. Firstly, the radical humanist paradigm is located in the top left of the above matrix, between the subjectivism dimension on the left and radical change. In this paradigm, the researcher is attempting to provide changes that differ from what in the status. Moreover, this paradigm is linked to the subjectivism dimension, which leads the researcher to adopt the interpretivism philosophy. Secondly, the radical structuralist paradigm is located at the top right side of the matrix and is placed between the objectivism dimension and radical change. This paradigm takes into account the major change that would be made by a researcher who is willing to analyse the correlation between players such as stakeholders in a company or organisation. Regarding this paradigm, the researcher has to adopt the objectivism dimension, which is linked to the positivism philosophy. Thirdly, the interpretive paradigm is located at the bottom left of the above matrix between the subjectivist dimension and regulation. Regarding this paradigm, the researcher depends on an explanation and interpretation of the world in order to define the meaning of the present phenomenon. In this situation, the researcher will adopt the interpretivism philosophy in order to identify the meaning. Finally, the functionalist paradigm is located at the top right side of the matrix between the objectivist dimension and regulation. By choosing functionalism, the researcher has to become objectivist and the main aim of this paradigm is to investigate why and how a specific phenomenon has arisen. Moreover, if the specific phenomenon has caused problematic issues, the functionalist paradigm defines solutions if they can be resolved.

4.5.2.2 Research Paradigms in Information Systems

According to Mingers (2001), paradigms can be defined as a set of beliefs and assumptions that guide the actions and activities of a researcher through the procedure of conducting a study. In order to define a paradigm, Devers (1999) stated that there are three essential questions that reflect the beliefs of researchers: the first question reflects the ontological belief, the second question reflects the epistemological belief and the last one reflects the methodological belief. Those questions are as follow: (1) what is the form and nature of the reality that is addressed, or what is assumed?; (2) what is the nature of true knowledge?; (3) what is the best approach, or set of guidelines, to help generate the desired knowledge and understanding in a valid and reliable manner?. Orlikowski and Baroudi (1991) categorised the beliefs into three basic underlying kinds of research: physical and social reality beliefs, knowledge beliefs and the relationship between knowledge and the empirical world. The following table (4.3) explains the three underlying beliefs:

Table 4.3: The Different Underlying Beliefs.

Beliefs	Type	Description
Physical and social reality	**Ontological beliefs**	Have to work mainly with the phenomena under research; that is, whether the empirical world is assumed to be objective and hence independent of humans in creating and recreating it.
	Human rationality beliefs	These kind of beliefs work and deal with the intentions certified by several researchers of the humans they study.
	Social relations beliefs	Always related to the way that people cooperate with organisations, groups and society.
Beliefs about knowledge	**Epistemological assumptions**	Concern the principles by which valid knowledge about a phenomenon may be constructed and assessed
	Methodological assumptions	Indicate which research methods and techniques are considered appropriate for gathering valid empirical data.
Beliefs about the relationship between knowledge and the empirical world	**Role of theory**	These kind of beliefs concern the role of theory based on the world of practice and reflect the beliefs of the researcher in what they intend to achieve.

Source: (Orlikowski and Baroudi, 1991).

The epistemological assumption is linked with three main choices; interpretivist, positivist or critical paradigms, which is considered as an important issue in the Information Systems field (Walsham, 1995). Many researchers and scholars (such as Myers and Avison, 2002; Chen and Hirschheim, 2004; Pare, 2004) have discussed and identified the three different paradigms. The following table (4.4) demonstrates a summary of the basic beliefs, which are linked to the different paradigms.

Table 4.4: The Differences Among the Basic Underlying Beliefs

Underlying Beliefs	Positivist	Interpretive	Critical
Physical and social reality	-World exists independently of humans (ontology). -Human action is intentional and bounded rationality.	-World is produced and reinforced by humans through interaction. -Humans interpret rather than discover the world.	-Social reality is historically and culturally constituted. -Belief in human potentiality. -Social relations are constantly undergoing change.

	-Social relations are generally stable and steady.		
Knowledge	-Universal law and principles, lower level hypotheses derived. -Goals: explanation, prediction and prescription. -Suitable for survey, experiments and case study	-Explain how meaning is created and sustained in specific settings. -Goals: explanation and insight. -Best for case studies.	-Phenomena can only be understood historically. -Goal: critique when interpretation is not enough. -Best for longitudinal studies and ethnographies.
Relationship between theory and practice	-Focuses on means to desired end. -Focus to improve the objective of the study.	-Weak and strong constructionist views. -Complements positivism or replaces it (objective of study).	-Initiate process of self-reflection among actors. -Some require transformation of self and social reality

Source: (Myers and Avison, 2002; Chen and Hirschheim, 2004).

Table (4.5) presents the assumptions and the objectives, which are related to the three different paradigms.

Table 4.5: Assumptions and Objectives of the Three Main Research Paradigms

Assumptions and Objectives	Positivist	Interpretive	Critical
Worldview	Objective rational view: (technology is natural) and (value consensus on its benefits exists).	Subjective view: (Addresses different interpretations of actors) and (a socially constructed view).	Based on examining the different interests involved: (oriented towards a cause).
Aims	Either to measure, predict, describe, inform/improve and (normative/prescriptive intent).	-Understand meanings people assign to phenomena. -Use insight to inform other settings.	-Expose deep-seated, structural contradictions in social systems. -Transform these alienating and restrictive social conditions.
Accounts	Description presented as fact not value judgment.	-Address how information systems influence and are influenced by context. -Local circumstances are important.	-Challenges assumptions about information systems strategy, organisation and management.

Source: (Pare, 2004).

Additionally, there are many arguments in the literature regarding the three main paradigms, which are related to the field of Information Systems. Myers and Avison (2002) stated that a positivism philosophy can be chosen if there is evidence for formal propositions, hypotheses, quantifiable measures of research variables (dependent and independent), testing a phenomenon from a representative sample for a whole population, and finally drawing of inferences and conclusions about the examined phenomenon from a sample that is representing the research population. Chen and Hirschheim (2004) declared that interpretivism philosophy can be appropriate for researchers who assume that knowledge of reality can be gained from social context such as language, consciousness, shared meanings, documents and tools. Moreover, interpretative study focuses on the difficulty of human sense making and negates either the predefined independent variables or dependent variables. This suggestion by Chen and Hirschheim is based on the declaration of Walsham (1993), which confirmed that the main aim of the interpretative paradigm in the field of information systems is to understand the context and the process of information systems, whereby the information system effects and is affected by the context. The last main type, which is the critical philosophy, focuses on various issues such as social critique, seeking to assist in eliminating the causes of unwarranted alienation and domination (Hirschheim and Klein, 1994). Moreover, according to Avison and Pries-Heje (2005), researchers who depend on critical assumptions agree that social reality is historically constituted and can only be provided by humans.

The study by Chen and Hirschheim (2004) has compared positivism and interpretivism in terms of ontology, epistemology and methodology. The following table (4.6) demonstrates the differences between the two main philosophies.

Table 4.6: Differences Between Positivism and Interpretivism Philosophies

Assumptions	Positivism	Interpretivism
Ontology	Reality exists objectively and independently from human experience	Reality is constructed through human and social interaction
Epistemology	Refers to the hypothetical deductive testability of theories; moreover, it seeks to generalize the results of the study.	Assumes that scientific knowledge should be obtained through the understanding of people and society. Moreover, it tends to be more subjective
Methodology	Tests hypothetic-deductive theory by taking a value free position and applies objective measurement to collected study data. An example for a positivist instrument is the quantitative method, which can be conducted by a questionnaire.	Requires researchers to be involved in the social setting investigated and learn how the communication takes place from the contributors' perspective.

Source: (Chen and Hirschheim, 2004).

Other arguments have been highlighted by researchers in the information systems field regarding the positivism philosophy. For instance, Myers and Avison (2002) have confirmed the definition of positivism philosophy in information systems, which was proposed by Orlikowski and Baroudi (1991). The definition assumed that the reality in positivism is objectively given and can be explained by measurable properties, which makes the researcher outside (independent) of the study and the applied instrument. Moreover, positivist researchers usually adopt it in order to test theory and/or to enrich the understanding and the knowledge of a phenomena. Another statement by Hirschheim (1991) highlighted that positivism is an epistemology, which searches for an explanation and prediction of a phenomena that happens in the social world by examining consistencies and underlying relationships between its constituent elements.

4.5.3 Research Philosophy

Research philosophy is an all-embracing term, which refers to the creation of knowledge and the nature of that knowledge. Research philosophy appears in the literature under different names and labels, depending who the author is, with such terms as research paradigm, epistemology and ontology, and philosophical worldviews (Creswell and Poth, 2017).

According to Quinlan (2011), every researcher has to adopt a particular philosophy regarding the nature of knowledge that has to be gained in order to satisfy the reason for undertaking the conducted research. Brannen (2005, p. 7) also argues: *'the researcher's choice of methods is said to be chiefly driven by the philosophical assumptions - ontological and epistemological - which frame the research or the researcher's frame of reference.'*

Therefore, the second step for any researcher after defining his/her ontology, is to define the suitable epistemology for the conducted research which has been defined by Saunders et al. (2016) as the adequate knowledge/data that will lead the research to reach his/her goal in a particular matter. Based on the ontology and the epistemology, a researcher can adopt the suitable methodology and method for his/her research. Moreover, ontology and epistemology will determine how methodology and method will be applied in the conducted research. Thus, each step has to be chosen very carefully, with justification for each step clearly defined. This is because, in the end, the required knowledge of a conducted research, such as the sample size, data collection techniques and the way that the researcher will address the objectives, will be clearer.

Regarding the decision in choosing a research philosophy, there are two main views in the literature. The first view of several scholars is that there is no set of strict rules that a researcher is forced to follow in order to choose the most appropriate philosophy for his/her undertaken research (Jankowicz, 2000; Easterby-Smith et al., 2015). The second view in the literature by other scholars confirms that it is important for a researcher to apply one of the already known philosophies, as by doing that the researcher would not make a huge mistake by wasting his/her time looking for a philosophy that might not even exist in the research field (Collis and Hussey, 2013; Saunders et al., 2016).

Morgan and Smircich (1980), proposed a figure illustrating the distinctions between subjectivism and objectivism, the most widely used philosophies in social sciences. Firstly, there is the positivism philosophy that appears on the right side of the figure, and which tends to be referred to as the deductive approach and, secondly, the interpretivism philosophy that appears on the left side of the figure, which tends to be referred to as the inductive approach (Easterby-Smith et al., 2015). The following figure (4.2) demonstrates the distinctions between the two mentioned philosophies.

Figure 4.2: Distinguishing Between the Two Paradigms in Social Sciences

Reality as a projection of human imagination	Reality as a social construction	Reality as a realm of symbolic discourse	Reality as a contextual field of information	Reality as a concrete process	Reality as a concrete structure

Source: (Morgan and Smircich, 1980)

Several researchers and scholars have addressed the differences between the two most widely used philosophies in social sciences research. Saunders et al. (2016) declared that believers in the positivism philosophy always attempt to be independent from the reality of their research; moreover, the main aim of their studies is testing and determining theories based on empirical research such as experiment and survey. On the other hand, Creswell et al. (2003) and Berg et al. (2009) declared that advocates of the interpretivism philosophy believe that social construction is the only way to get access to knowledge and reality. The following four subsections will explain in more details these two main research philosophies.

4.5.3.1 Positivism Philosophy

Historically, the positivism philosophy has been associated with the emergence of the natural sciences (Remenyi et al., 1998). Therefore, the main notion of the positivism philosophy is that a researcher has to be independent of his/her study; moreover, the undertaking of the research should not influence the researcher in the meantime (Ibid). According to Easterby-Smith et al. (2013), the different kinds of studies that can be examined by inflection, intuition and sensation cannot adopt the positivism philosophy; this is because the positivist is persuaded that reality can be observed objectively. Morgan and Smircich (1980) state that the positivism philosophy tends to lead to the selection of a deductive approach, which is considered as the most appropriate approach by positivist believers. However, Bryman and Bell (2015) declare that positivist believers can adopt both approaches: 'deductive' and 'inductive'. They have justified their statement by suggesting that when a researcher builds or tests a theory by providing a set of hypotheses that can be examined, then that would be supported by the deductive approach, but when a researcher is attempting to collect data for his/her study in order to propose new knowledge, then that would be supported by an inductive approach.

4.5.3.2 Weaknesses of Positivism

The firm belief of positivism indicated that everything is measurable and that the researcher is an outsider and detached from the study, has been viewed by critics to be unproductive and only showing one side of the story, and that collecting statistics and numbers is not the answer to understanding meanings, beliefs and experience. Collis and Hussey (2013) highlight a number of criticisms of positivism, which include: (1) it is impossible to separate people from the social context in which they exist; (2) people cannot be understood without examining the perceptions they have of their own activities; (3) capturing complex phenomena in a single measure is misleading. The above points of criticisms are further reinforced by Connell and Nord (1996, p. 1) who argue that: (i) if reality is external and unknown to humans, then how do we accumulate knowledge regarding it?; (ii) if we are accumulating knowledge about it, how do we know that we are doing it? From this perspective, any philosophical debate is moot because we do *"…not know how to discover a correct position on the existence of, let alone the nature of, reality.*"

4.5.3.3 Positivism Philosophy in the Field of Information Systems

Many statements have been highlighted by researchers and scholars regarding the positivism philosophy in the area of Information Systems. According to Kaplan and Duchon (1988), the positivist view allows researchers to test the impacts of one or more variables on one another. Orlikowski and Baroudi (1991) stated that the most popular and dominant philosophy regarding information systems is positivism. A statement by Creswell (2013), declared that the knowledge derived from the positivism philosophy is always based on the researcher's observation or measurement of the reality that exists in the world. Therefore, developing a quantitative instrument in order to study the behaviour of individuals is dominant for a positivist.

In the current study, the epistemology that fits its aim and objectives is positivist. This can be based upon two main justifications and each one of them depends on the other; the first reason is the existence of various social and technical issues in the literature regarding ERP systems; the second, as a consequence, is the assessment of the ERP systems' impact on academics' performance cannot certainly be separated from the expectations and requirements of universities and end-users.

4.5.3.4 Interpretivism Philosophy

The interpretivist philosophy plays the opposite role to that of the positivism philosophy. Therefore, interpretivism does not tend to be objectivist or external and it is referred to as socially constructed (Quinlan, 2011). The significance of interpretivism has risen because of the criticism among researchers in the literature regarding the positivism philosophy and its restriction to the social sciences (Easterby-Smith et al., 2015). Therefore, Cohen et al. (2013), proposed a comprehensive definition of the interpretivism philosophy by stating that the interpretivism philosophy can be considered as a theoretical viewpoint that tends to take experience as the gained knowledge of research. Moreover, the behaviour can be explained by experience more than by external or objective factors. Therefore, based on the above definition, the reality in interpretivism philosophy can only be determined by humans. Interpretivism supporters have to bear in mind how individuals are related and attached to the issue to be explored in the study. Crotty (1998) declared that the supporters of interpretivism philosophy have to be subjective, which means they have to experience and be involved directly in the issues raised by the research. Saunders et al. (2016) referred to interpretivism as the way people think and the ways individuals make sense of everything that surrounds them.

4.5.4 The Difference between Positivism and Interpretivism

Many academics and researchers have attempted to summarise the differences between the two widely used philosophies. Bryman and Bell (2015) stated that positivism has the advantage of explaining people's behaviours, while interpretivism produces better knowledge regarding the differences between people's activities and actions. Additionally, while positivism supporters tend to adopt the quantitative method, interpretivism supporters prefer to adopt the qualitative method (Remenyi et al., 1998; Collis and Hussey, 2013; Saunders et al., 2016). The following table (4.7) demonstrates some of the dissimilarities between the two philosophies in different aspects:

Table 4.7: Comparison Between Positivism and Interpretivism Philosophies

Philosophy / Aspects	Positivism	Interpretivism
Observer	Must be independent	Is part of what is being observed
Human interest	Should be irrelevant	Are the main drivers of science
Explanations	Must demonstrate causality	Aim to increase general understanding of the situation
Research progress through	Hypotheses and deductions	Gathering rich data from which ideas are induced
Concepts	Need to be operationalised so that they can be measured	Should incorporate stakeholder perspectives
Units of analysis	Should be reduced to simplest terms	May include the complexity of the whole "situation"
Generalisation through	Statistical probability	Theoretical abstraction
Sampling requires	Large numbers selected randomly	Small numbers of cases chosen for specific reasons
Data collection techniques most often used	Highly structured, measurement, quantitative, but can use qualitative	In-depth investigations, qualitative

Source: (Easterby-Smith et al., 2013).

According to Amaratunga et al. (2002), each philosophy has strengths and weaknesses, which play essential roles regarding the selection of the most appropriate methodology and method to be adopted in the conduct of the research/study. The following table (4.8) illustrates several strengths and weaknesses related to the positivism and interpretivism philosophies:

Table 4.8: Strengths and Weaknesses of Positivism and Interpretivism		
	Positivism	**Interpretivism**
Strengths	Can provide wide coverage of the range of situations. Can be fast and economical. Where statistics are aggregated from large samples, may be of considerable relevance to policy decisions.	Data-gathering methods are seen as natural rather than artificial. Ability to look at change processes overtime. Ability to understand people's meaning. Ability to adjust to new issues and ideas as they emerge. Contribute to theory generation.
Weaknesses	The methods used tend to be rather inflexible and artificial. They are not very effective in understanding processes or the significance that people attach to actions. They are not very helpful in generating theories. Because they focus on what is, or what has been recently, they make it hard for policy makers to infer what changes and actions should take place in the future.	Data collection can be tedious and require more resources. Analysis and interpretation of data may be more difficult. Harder to control the pace, progress and end-points of the research process. Policy makers may give low credibility to results from qualitative approach.

Source: (Amaratunga et al., 2002).

4.5.5 The research philosophy selected for this study

Selecting a research method or combination of methods is largely influenced by the type of questions asked and the nature of the problem the study seeks to address and what the researcher aims to find out. Thus, the rationale for choosing the methodology and methods of a study does not happen by chance. According to Menacere (2016), the researcher philosophy and paradigm are based in a clear philosophical assumption, in terms of best practice; researchers must deliberate the type of knowledge to be generated.

The methodology chosen for this study is informed by the appropriate underpinning philosophy in line with the nature of the problem and objectives of the study, which is to investigate the factors that significantly impact academics' performance while using ERP within the Saudi universities' context. Predominantly positivist, this study seeks to generate knowledge based on numerical evidence. On the other hand, it is also attempting to grasp the essence of ERP systems and their impact on academics' performance and to gauge their expectations and experience with the quality of service provided by ERP systems. There is an on-going debate as to which method and methodology is better than the other. Each has its own strengths and weaknesses, which actually vary depending upon the nature of the topic. As

Menacere (2016) stresses, methodology and methods should be selected for their fitness to achieve the aim of the study.

Saunders et al. (2016) believe that there is no one research philosophy better than another. Each research philosophy is better at doing different things and, therefore, a researcher should select the methodology and method, which can help to achieve their research objectives. As always, which is *'better'* depends on the nature of the problem and the research questions the study is trying to answer. This study focuses on investigating the implemented ERP systems within the universities' context. It involves the collection of data through questionnaire about what impact ERP systems have on the academic staff's performance. It evaluates the attitude and opinions of participants concerning the variables or success factors of ERP systems.

4.6 Research Approach

According to Saunders et al. (2016), there are two approaches that can be adopted by researchers: 'deductive' and 'inductive'. However, they have stated that the understanding of the research undertaken by the researcher is the only way to determine the most appropriate approach, which will suit the research type. Saunders et al. (2016) highlighted that the deductive approach is more suitable to a researcher who seeks to develop or test a theory and/or hypothesis. On the other hand, the inductive approach is more appropriate to a researcher who is willing to collect the study data through interviews and observations. In this approach, by interpreting the interviews and the observation, the researcher can generate a new theory or support an existing theory in a different context. Therefore, in the deductive approach, the theory has to be demonstrated from the beginning because the main aim for the deductive approach is to test or develop an existing theory or hypothesis, while in the inductive approach; the theory comes in the end as the main result of the collected data and the study in general.

Several scholars have associated the two approaches with different philosophies in order to make it clearer and simpler for other researchers. Easterby-Smith et al. (2015) linked the positivism philosophy directly with the deductive approach and associated interpretivism with the inductive approach. In another example, Saunders et al. (2016) provided a table comparing the deductive and the inductive approaches in order to clarify the differences and why the deductive approach has been linked to positivism and the inductive approach to interpretivism. The following table (4.9) illustrates the different characteristics between the two approaches:

Table 4.9: Differences Between Deductive and Inductive Approaches		
Approach Key different	**Deduction emphasises**	**Induction emphasises**
Knowledge	Scientific principles	Gaining an understanding of the meanings humans attach to events
Aim	Moving from theory to data	A close understanding of the research context
Requirement	The need to explain causal relationships between variables	The collection of qualitative data
Data collection method	The collection of quantitative data	A more flexible structure to permit change of research emphasis as the research progresses
Validity	The application of controls to ensure validity of data	A realisation that the researcher is part of the research process
Clarity and generalising	The operationalisation of concepts to ensure clarity of definition	Less concern with the need to generalise
Researcher position	Researcher independence from what is being researched	
Sampling	The necessity to select samples of sufficient size in order to generalise conclusions	

Source: (Saunders et al., 2016).

Despite the dissimilarities and the different reasons for using the deductive and inductive approaches, Saunders et al. (2016) declared that both approaches can be linked and used together in order to gain more advantages for the study. Based on the above view, if a researcher has well understood and addressed the nature of his/her undertaken research, this would make it easier for the researcher to adopt either the deductive or the inductive approach. Creswell (2013) proposed several criteria that can be followed as guidelines for the process of choosing the most suitable approach for the conducted research. Those criteria include the synthesis of the literature that is available, the time availability for the researcher, the risks and the limitations of the study and finally the associated participants for the study. However, Creswell and Poth (2017) declared that the most effective criteria belong to the nature of the subject under study. This is because if the subject has a rich literature, the deductive approach tends to be more suitable for such a topic, whereas, if the topic is newer or never been discussed, the inductive approach is more appropriate in that case. The following table (4.10) summarises the guideline criteria to assist in choosing the appropriate approach for a particular study:

Table 4.10: Several Criteria to Choose the Appropriate Approach		
Approach / Criteria	**Deductive**	**Inductive**
The availability of the related literature	To adopt this approach the literature has to be broad	The related literature is scant for many reasons - for example, a new field of study or new topic that has never been investigated or explored before.
The time limitations for the researcher	The time available in this approach could be specific and limited.	The time available needs to be longer because the topic is new or only a few studies have been published about it.
The associated risk with the research	Low risk because most of the research work depends on evidence stated by other scholars.	Sometimes the researcher may take a high risk by studying a topic which has no previous evidence
The participants in the conducted research	This approach tends to use a greater number of participants to validate a model or a theory	May have only a small number of participants to explore a new phenomenon or to ground a theory

Source: (Creswell, 2013).

4.7 Types of Research

The two key research types widely referred to in the methodology literature are pure /basic research and applied research.

4.7.1 Pure/Basic Research

Pure research asks fundamental questions in the area under investigation. It is also known as fundamental or theoretical research. It seeks to generate pure knowledge that may uncover issues, theories, laws or metaphors. In basic research, general theories, ideas and questions are explored and tested that may help explain why things operate as they do or why they are as they are. It aims to produce significant new facts and general theories. Research adds to the existing body of knowledge but it does not necessarily provide results of immediate, practical implications.

4.7.2 Applied Research

Applied research is based on the concept of pure research. The purpose of applied research is to solve an immediate, practical problem. It has social or economic benefits and it addresses an issue in order to find results or solutions for real life problems. It employs and helps in developing the techniques that can be used for basic research.

4.7.3 Purpose of Research

In general, research can be divided into three different categories: exploratory, explanatory and descriptive which are strongly linked to the purpose of the study (Kervin, 1992). First of all, the exploratory study classification focuses on what is happening in order to clarify several issues such as exploring a new understanding about a specific phenomenon, appraising an issue in a new way and perspective and asking a question about a particular matter (Robson and McCartan, 2016). Explorative researches are appropriate when a new field is under investigation or when there is only little knowledge about the topic field of interest (Polit and Beck, 2010). Therefore, it is applied to explore the full nature of the phenomenon and the factors that relate to the phenomenon under investigation. Moreover, it can be used in order to gain more knowledge about a specific issue that the study has detected (Robson and McCartan, 2016). According to Kowalczyk (2013), explorative studies support researchers to understand the drivers and barriers of the environmental issues and ascertain the variables that will be applicable to the study. In addition, in the case of a researcher seeking to gain more understanding regarding unclear matters, where the researcher is uncertain about the important characteristics and relationships relevant to a given situation, explorative studies can be considered as the most suitable and useful to be applied (Yin, 2013; Gray, 2014; Saunders et al., 2016). Thus, explorative studies are usually applied when there is ambiguity or little knowledge available regarding the issues/problems under research (Polit and Beck, 2010; Gray, 2014). Indeed, different collection techniques can be used as data collection tools for explorative studies such as interviews, case studies and literature review, which can produce both data methods (quantitative and qualitative) in order to give a clear picture about the problem under investigation (Collis and Hussey, 2013; Gray, 2014; Saunders et al., 2016).

While the second type, explanatory research seeks to answer, ‘why’ and ‘how’ kinds of questions concerning the nature of the correlations among study variables (Zikmund et al., 2013; Collis and Hussey, 2013; Gray, 2014), according to Kowalczyk (2013), explanative studies can be considered as studies that attempt to identify the cause and impact of research problems. Therefore, explanative studies can identify any causal relationship between the variables that influences the research under investigation. Moreover, in explanatory studies, existing theories are used by researchers in order to develop hypotheses concerns the estimated relationships amongst the research variables. Afterwards, researchers collect both kinds of data (quantitative and qualitative) in order to test the estimated hypotheses (Blumberg et al., 2011; Sekaran and Bougie, 2016). Creswell and Poth (2017) stated that explanatory studies are appropriate and popular with a strong quantitative orientation, thus the study frequently starts with the quantitative method and then follows by a qualitative method.

The third kind of research is known as descriptive usually describes the characteristics of the essential variables in a certain phenomenon. According to Burns and Grove (2010), the main purpose of descriptive studies is to present a full view of a phenomenon as it naturally occurs. Moreover, descriptive studies could be applied in order to develop theories under research and to describe and explain current practice and make a judgement on them. Therefore, descriptive studies are seeking to answer ‘what’, ‘who’, ‘where’ and ‘how’ kind of questions, which could take the investigation beyond the reach of explorative and explanative studies (Enayet and Supinit, 2016).

Both types of research, which are descriptive and explanatory, focus on the data collected by the researcher, and both are associated with the hypotheses and the questions of the research that have been produced by the researcher from the beginning. Hence, the descriptive and the explanatory studies mainly depend on the available data (Kervin, 1992).

The current research starts with an exploratory phase by involving an investigation process and research framework designing process, followed by an explanatory phase that involves of a testing process and an analysis process. The current study tends to be exploratory; this is because the main objective and concern of the current study is to discover the ERP systems’ factors that strongly influence the academics’ performance in the context of Saudi universities. Thus, the exploratory phase in the current study will support in investigating the factors that could influence academics’ performance while using ERP systems in the Saudi universities’ context. Moreover, the literature review is an essential element of the exploratory phase in order to understand the topic under research and explain important issues, revealing how this topic is treated and investigated.

Regarding the objectives of the current study, it is vital to collect and gain a large and adequate amount of data for the study; therefore, according to Easterby-Smith et al. (2015) and Saunders et al. (2016), the survey is considered as the most appropriate method in this case. Taking into account the lack of stakeholders’ performance measurement studies in the region, semi-structured interviews were also proposed and conducted to gain rich information and deeper understanding of the significant factors that impact academics' performance while using ERP systems in the universities' context. Hence, using questionnaires and interviews will produce meaningful findings for the present study (Saunders et al., 2016).

On the other hand, the explanatory phase will be applied for the current study by developing a theoretical model of the factors that significantly influence academics' performance while using ERP systems in the universities' context according to the literature of Information Systems and ERP systems, which will provide cause and effect relationships that give better understanding of the main research problem. The following table (4.11) demonstrates the features of the three different types of research.

Table 4.11: Key Features of Three Different Types of Research

	Exploratory Research	Descriptive Research	Explanatory Research
Degree of Problem Definition	Key variables not defined	Key variables are defined	Key variables and key relationship are defined
Possible Situations	"Quality of services is declining and we do not know why."	"What have been the trends in organisational downsizing over the past ten years?"	"Which of two training programs is more effective for reducing labour turnover?"
	"Would people be interested in our new product idea?"	"Did last year's product recall have an impact on our company's share price?"	"Can I predict the value of energy stocks if I know the current dividends and growth rates of dividends?"
	"How important is business process re-engineering as a strategy?"	"Has the average merger rate for financial institutions increased in the past decade?"	"Do buyers prefer our product in a new package?"

Source: (Creswell and Poth, 2017).

4.8 Data Collection Methods

There are various methods for collecting data. Each data collection method has advantages and disadvantages and is suitable for a particular study to achieve the objectives. The researcher chooses from a variety of data collection methods in order to explore, define, understand and describe phenomena.

4.8.1 Quantitative Research

The most appropriate definition for the current study regarding the quantitative method is the definition that has been proposed by Creswell et al. (2003), which uses the quantitative method as the means for investigating the correlation among variables that can be tested through numeric instruments, which can then be analysed by statistical processes. Moreover, Creswell (2013) makes another important point that it is usually quantitative methods, which provide assumptions that examine the theories deductively. This is for three main reasons: increasing the protection of the study from bias; controlling alternative explanations; increasing the ability to generalize the results of the undertaken research.

4.8.2 Qualitative Phase

Some researchers have argued that it may be appropriate to think of qualitative and quantitative as being on a continuum, being viewed as polar opposites (Gray and Densten 1998; Teddlie and Tashakkori, 2003). Cassell and Symon (1994) provide the following list of defining features for qualitative research: (1) emphasis on subjectivity rather than objectivity; (2) flexibility in the process of conducting research; (3) an orientation towards process rather than outcom; (4) a concern with context - regarding behaviour and situation as inextricably linked in forming experience.

4.9 The Selected Method for the Current Study

The current study has applied the quantitative method as the main method to collect the data. The rationale for adopting a quantitative research approach is closely related to the purpose of the study, the nature of the problem and the research objectives. Research is often multi-purpose and few studies sit comfortably within a wholly quantitative or qualitative approach. Quant/qual methods, like philosophies, are neither better nor worse than each other, but are selected as the best method to answer the research questions. Many authors, such as Jankowicz (2000) and Robinson (2002) emphasise that there is no straightforward rule, which forces the researcher to choose one method for one investigation and another for another investigation. It is therefore pointless to argue that one method is superior. Both have their strengths and weaknesses and can complement each other and can work well together. In other words, quantitative and qualitative can work well together; they are not incompatible despite their very different underlying philosophies.

The main reason for the researcher's choice is based on the main assumption for the quantitative approach, which is related to human behaviour and that can be clarified by what could be called social facts. According to Amaratunga and Baldry (2002), social facts can be studied by employing a deductive approach. In addition, quantitative research can be considered as the most appropriate for several kind of studies such as comparison studies, studies focusing on a subject under analysis measured through objective methods rather than subjective, studies that determine reliability and validity, studies that measure descriptive aspects of behavioural elements and studies highlighting the need to formulate a hypothesis for subsequent verification.

Indeed, the current study aligns itself with the last two types of study, measuring descriptive aspects of behavioural elements and highlighting the need to formulate a hypothesis for subsequent verification. Therefore, the quantitative approach appears to be the most suitable approach for the current study. However, there is a need to use mixed methods by conducting interviews in the data collection phase.

4.9.1 Mixed-Method Approach

Combining two methods together can be termed as mixed methods, which has been used increasingly in many studies, particularly in practical studies (Leech and Onwuegbuzie, 2009). According to Johnson et al. (2007) and Johnson and Christensen (2013), mixed methods can be considered as the third main applied method in the field of research. Teddlie and Tashakkori (2006, p. 15) provided a broad definition of the mixed methods approach that is *"research in which the investigator collects and analyses data, integrates the findings, and draws inferences using both qualitative and quantitative approaches and methods in a single study or program of inquiry"*. Johnson et al. (2007) proposed approximately nineteen different definitions that related to mixed methods regarding the different points of view such as data collection and data analysis.

Additionally, there are two main justifications for researchers to apply the mixed methods approach; the first reason is that adopting different methodological approaches will help researchers to deal with the weakness in validity that might occur through use of a single method such as quantitative or qualitative and which will increase both the validity and the quality of the results; the second reason is that mixed methods could provide a broader picture and improve the understanding of the problem/phenomena under research (Kelle, 2006). In fact, using mixed methods has been supported, particularly in investigation and evaluation research, by many authors such as Kaplan and Maxwell (2005), Irani and Love (2008) and Bryman and Bell (2015). Moreover, according to Johnson et al. (2007), using mixed methods is beneficial in order to decrease the weakness associated by using a single method and will provide richer and better results that help to achieve answers for the research questions.

Based on the above discussion, the current study has adopted the quantitative approach generally and mixed methods particularly in data collection as triangulation, in order to increase the understanding of the research issue and the study context, which is the Saudi universities' context and ERP systems' impact on its academics' performance. In addition, the current study can be considered as an investigation and an evaluation type of research, which is preferred to undertaking mixed methods approach (Teddlie and Tashakkori, 2003).

4.9.2 Planning Mixed-Method Procedures

In order to apply mixed methods, there are four important phases which have been highlighted by Creswell (2013) to be carefully considered by any researchers. Those phases are timing, weighting, mixing and theorizing. The following table (4.12) describes and defines each one of them:

Table 4.12: Four Important Phases to Plan The Mixed Methods

	Definition	Sequence		
Timing	Researchers are requested to consider the timing of data collection, whether if both quantitative and qualitative methods for data collection will be used sequentially or concurrently.	No sequence: concurrent	Sequential: qualitative first	Sequential: quantitative first
Weighting	Researchers are requested to select which method has the highest attention and priority, or maybe both methods will receive equal priority. Moreover, the level of priority has to be decided in respect of the aim of the study and the interests of the researcher.	Equal	Integrated	Explicit
Mixing	Researchers are requested to answer when and how mixing should be used. There are several steps when researchers can use mixing such as data collection, data analysis, interpretation, or in the three mentioned steps together.	Qualitative	Connecting	Implicit
Theorizing/ Transformi	This phase uses the theories and frameworks in order to shape the kind of questions, which ask who are the participants in the study, how data will be gathered and implications of the results.	Quantitative	Embedding	Implicit

Source: (Creswell et al., 2003).

In the current study, the researcher has decided to select the quantitative method as the primary data, followed by the qualitative data as supportive data for the primary. Moreover, the mixing of the data will be only in the discussion chapter and the implemented theories as discussed earlier will be the three integrated models (The DeLone and McLean Model of Information Systems Success, Task-Technology Fit, End-User Computing Satisfaction). In addition, the adopted strategy is the sequential explanatory strategy, which is the most widely used strategy in the mixed methods approach. It starts by collecting and analysing the quantitative data and based on the findings of the qualitative analysis, the qualitative method will be designed and data gathered.

By combining the two methods together in order to collect the data for the study, this is considered as an advantage and useful for the study (Collis and Hussey, 2013). For instance, mixing the quantitative and qualitative data will enrich the findings of the study, which will provide the best solution and answer for the problem that is under research. Moreover, according to Blumberg et al. (2011), the mixed collected data that cover a particular problem or phenomena produce the chance for data triangulation, even though the sources of the data have to be independent from each other.

4.9.3 Triangulation

According to Yin (2013), triangulation can be defined as a concept that allows a researcher to apply more than one method whether simultaneously or sequentially in order to study a specific point from different perspectives. Moreover, it increases the validity and the knowledge of the study. Sarantakos (2012) stated several reasons for adopting mixed methods such as increasing the amount of collected data and knowledge, enhancing the nature of the study data, increasing the validation of the collected data and finally to avoid the shortages of mono method studies. Similarly, other researchers and scholars have agreed that triangulation adds value to the different studies (Hussey and Hussey, 1997; Gummesson, 2000; Bryman and Bell, 2015). This is because gathering data from different independent sources in order to solve one problem will improve the validity and the reliability of the study's findings, which will lead to the proposal of superior solutions or recommendations (Collis and Hussey, 2013). Therefore, combining more than one method is commonly used in order to increase the quality of the study that cannot easily be assured by applying a mono method (Flick, 2014; Bryman and Bell, 2015).

There are four main kinds of triangulation that have been specified by Easterby-Smith et al. (2013) and Flick (2014). The following table (4.13) illustrates the different types of triangulation:

Table 4.13: The Different Type of Triangulation

Type of Triangulation	Description
Data Triangulation	Contains different types of data sources in order to raise the validation of a research. Moreover, it can be used to study specific issue/phenomena in different periods of time or in different contexts.
Investigator Triangulation	Involves more than one researcher in the analysis phase in order to reduce the bias in the study findings.
Methodological Triangulation	Adopts multiple methods whether simultaneously or sequentially in order to study different aspects for a specific issue/phenomena.
Theory/paradigm Triangulation	Applies different theory and philosophies in order to view multiple perspectives regarding particular issues/phenomena.

Source: (Easterby-Smith et al., 2013; Flick, 2014)

Furthermore, other researchers and scholars in the literature have stated different kinds of triangulation. Sarantakos (2012) highlighted time triangulation, sampling triangulation and validity triangulation. However, several researchers have declared that a researcher is allowed to associate the different kind of triangulations together as a multiple triangulation (Denzin and Lincoln, 2005; Yin, 2013; Flick, 2014). Therefore, the current study has adopted comprehensive triangulation in order to increase the benefits from the advantages of the different kind of triangulation. The selected type of triangulation is as follows: (i) methodological triangulation: the researcher has used two different kinds of instruments in order to gather data (questionnaires and semi-structured interviews); (ii) theory triangulation: the researcher has adapted the integrated frameworks proposed by Althonayan and Papazafeiropoulou (2013), which suggested the use of three dominant models in the field of ERP systems; (iii) validity triangulation: the researcher has applied multiple analysis and methodological triangulation techniques and processes in order to increase the validity and the credibility of the study (Sarantakos, 2012).

Based on the above discussion, the present study has adopted mixed methods that include quantitative and qualitative tools in order to collect the primary data for the study, which will provide answers for the research questions and achieve the objectives of the study. The researcher has applied the questionnaire tool to represent the quantitative method and the semi-structured interviews to represent the qualitative method. According to Bryman and Bell (2015), the validity and the strength for a research applying postal questionnaires, which could possibly lead to a weak response rate, can be improved by applying other methods in order to guarantee face-to-face interaction. The following table (4.14) compares three different tools, which are questionnaires, personal interview and telephone interview from several perspectives:

Table 4.14: The Differences Between Three Main Data Collection Tools

	Questionnaire	Face-to-Face Interview	Telephone Interview
Budget	Lowest	Highest	Intermediate
Time Required to Collect Data	Intermediate	Highest	Lowest
Response Rate	Lowest	Highest	Intermediate
Nature of Non-Response	Mostly refusals	Two-third refusals, one-third non-contacts	Mostly refusals and break-offs
Assessing Extent of Non-Response Bias	Poor	Good	Intermediate
Item Non-Response	High	Low	Low
Control of Measurement Situation	Poor	Good	Intermediate
Sensitive Topics	Best	Intermediate	Worst
Complex Topics	Poor	Good	Poor

Source: (Kervin, 1992).

4.8.3 The Difference between Quantitative and Qualitative Research

Many advantages and disadvantages have been highlighted by different scholars regarding quantitative and qualitative methods (Amaratunga and Baldry, 2002; Denzin and Lincoln, 2005; Creswell, 2013). The following table (4.15) summarises the advantages and the disadvantages:

Table 4.15: Some of the Advantages and Disadvantages for the Quantitative and Qualitative Methods

Method	Advantages	Disadvantages
Quantitative	-Method allows accurate measurement of variables. -Methods are structured. -Provides wide coverage of the range of situations. -Can be fast and economical.	-Use of inflexible methods. -Disregards some important factors. -Generation of incomplete understandings. -Inapplicable to some immeasurable issue or phenomena.
Qualitative	-Methods improve description and theory development. -Describes theories and suitable for experience. -Holistic and humanistic. -Inductive data analysis.	-Small samples. -Decision makers could give low attention and credibility to qualitative findings. -The interpretation of the results can be more complex and difficult. -The deep involvement of researchers could increase the issue of bias.

Source: (Denzin and Lincoln, 2005; Creswell, 2013).

4.10 Research Choice (Quantitative and Qualitative)

Determining the type of data that is required for a particular study is considered as the most important role in order to decide which method is the most appropriate to be chosen. The numeric data tend to be under the quantitative study, whereas, the non-numeric data such as words, films and pictures tend to be under the qualitative study (Collis and Hussey, 2013; Saunders et al., 2016). However, as has been mentioned and discussed in the previous section, several scholars have debated mixed methods and how it becomes acceptable by other researchers and scholars, especially in the business and management field, in order to benefit from the usefulness of both methods to increase the strength of the study's contribution (Bryman and Bell, 2015; Saunders et al., 2016). Additionally, the main philosophy for the mixed methods is that one method helps to prop up and reduce the complications of the other method.

In fact, mixed methods gives the researcher the flexibility to use the mixed approaches whether simultaneously or consecutively, in a way that suits the study. For instance, a researcher can start to collect and analyse the quantitative data and subsequently collect the qualitative data. This is because the instrument design for the qualitative data has to be driven and informed by the findings of the quantitative data. Saunders et al. (2016) discussed the adoption of mixed methods in both phases by applying them concurrently or sequentially. They stated that if the researcher uses the mixed methods concurrently that means both quantitative and qualitative methods have to be applied separately to provide a firm conclusion. Alternatively, if the researcher uses the mixed methods interactively and iteratively that means one of the methods is used subsequent to the other method in order to plan and design the next stage of the data collection and analysis. The following table (4.16) compares the three kinds of methods:

Table 4.16: Comparison Among the Three Methods (Quantitative, Qualitative and Mixed Methods)

Method / Perspective	Quantitative	Qualitative	Mixed Research
Scientific Method	Top down "confirmatory". The main aim is to test hypotheses and theory with data.	Bottom up "exploratory".	Both confirmatory and exploratory.

Ontology (Nature of Reality/Truth)	Objective, material and structural	Subjective, mental, personal and constructed	Pluralism, appreciation of objective, subjective and intersubjective reality and their interrelations.
Epistemology (Theory of Knowledge)	Scientific realism, search for truth, justification by empirical confirmation of hypotheses and universal scientific standards	Relativism, individual and group justification.	Dialectical pragmatism pragmatic justification "what works for whom in specific contexts", mixture of universal "always be ethical" and community specific needs based standards.
Form of Data Collected	Collect quantitative data based on precise measurement using structured and validated data-collection instruments.	Collect qualitative data such as in-depth interviews, participant observation, field notes, and open-ended questions. The researcher is the primary data-collection instrument.	Collect multiple kinds of data.
Data Analysis	Identify statistical relationships among variables.	Use descriptive data, search for (patterns, themes, and holistic features) and appreciate difference/variation.	Quantitative and qualitative analysis used separately and in combination.
Results	Generalizable findings providing representation of objective outsider viewpoint of populations.	Particularistic findings and provision of insider viewpoints.	Provision of "subjective insider" and "objective outsider" viewpoints and presentation and integration of multiple dimensions/ perspectives.

Source: (Johnson and Christensen, 2013)

The main reasons for adopting mixed methods, particularly in the business and management field have been explained by Saunders et al. (2016). The following table (4.17) summarises the main reasons for mixed methods adoption:

Table 4.17: The Justification for Adopting Mixed Methods

Reason	Explanation
Triangulation	Use of two or more independent sources of data or data collection methods to corroborate research findings within a study.
Facilitation	Use of one data collection method or research strategy to aid research using another data collection method or research strategy within a study (qualitative /quantitative providing hypotheses, aiding measurement, quantitative/qualitative participant or case selection).

Complementarity	Use of two or more research strategies in order that different aspects of an investigation can be dovetailed (qualitative plus quantitative questionnaire to fill in gaps, quantitative plus qualitative questionnaire for issues, interview for meaning).
Generality	Use of independent source of data to contextualise main study or use quantitative analysis to provide sense of relative importance (qualitative plus quantitative to set case in broader context; qualitative and quantitative analysis is to provide sense of relative importance).
Aid Interpretation	Use of qualitative data to help explain relationships between quantitative variables (quantitative/qualitative).
Study Different Aspects	Quantitative to look at macro aspects and qualitative to look at micro aspects.
Solving A Puzzle	Use of an alternative data collection method when the initial method reveals inexplicable results or insufficient data

Source: (Saunders et al., 2016).

4.11 Methods Used in Data Analysis

This section will discuss the quantitative data analysis and the qualitative data analysis in order to demonstrate the processes that have been applied to collect both kinds of data as well as their analysis.

4.11.1 Quantitative Data Analysis

The quantitative data are considered as the main data collected for the current study. Several sub-headings will be explained and discussed to cover the most important aspects regarding the quantitative data and their analysis, and include the main tool that has been applied to collect the data, which is the questionnaire, the population of the study, sample types, questionnaire structure, ethical considerations, pilot study, questionnaire administration, reliability and validity, and finally statistical tests employed.

4.11.1.1 Questionnaire

According to Thomas (2011), researchers can choose self-administered their questionnaires, which allows them not to be present and leaves the participants to fill their questionnaires without help. Questionnaires can also be researcher-administrated by asking the participants each question and then the researcher records their answers. The current study has applied the self-administered questionnaires, sending them to the participants, giving them a period of time to complete the questionnaires and then return them to the researcher. The present study has employed the questionnaire tool as a main technique to collect numerical data in order to achieve the aim and objectives of the current study. There are several types of questionnaire such as mail post questionnaire; e-mail questionnaire and face-to-face questionnaire. The last one means participants meet the researcher to submit the completed questionnaire personally. The current study has used the self-administered questionnaire either through the researcher or through an assistant administrator, which is in this case the Deanship of Scientific Research (DSR) in Taibah University. Moreover, in order to increase the number of collected questionnaires, several types have been applied such as postal and email questionnaires. The justification for choosing the self-administered questionnaire and the other types are related to three main reasons. Firstly, self-administrated questionnaires are considered as one of the most commonly used methods for primary data collection in the field of business and management research (Saunders et al., 2016). Secondly, postal questionnaires have been used because the DSR has to post the questionnaires officially within the local postal service in the Saudi universities. Finally, e-mail questionnaires have been applied because of the good internet connection in Saudi Arabia in general which uses fibre optics and therefore it is easy to contact academic staff through their email addresses.

Indeed, there are other advantages highlighted by scholars in the literature regarding the self-administrated questionnaire (Blumberg et al., 2011; Bernard, 2013; Easterby-Smith et al., 2015; Saunders et al., 2016). Advantages include targeting a large number of participants by using the postal service and internet as a distribution and collection channel; privacy, which allows participants to answer honestly because of the promise of anonymity associated with a questionnaire; finally, the questionnaire commonly allows a period of time depending on each researcher, which will enhance the overall response rate.

However, there are disadvantages that may be faced by using the questionnaire technique. One of the disadvantages is that the period of time given to participants may allow participants to write too much information that is not required. Therefore, it is essential to improve and develop the design of the questionnaire to ensure that the questions and the statements are clear and understandable for the targeted respondents. Another disadvantage is that there is a limited control on the postal or the e-mail questionnaire, which can be seen when the main participants redirect the questionnaire to their personal assistants in order to complete it, which could affect the results of the current study.

4.11.1.2 Sampling Population

The research population can be defined as the whole group of people, events or specific things of interest that are under investigation by a researcher (Sekaran and Bougie, 2016). However, many studies are facing difficulty in distributing and collecting data from the whole population due to two main reasons, the high cost and the time limitations of each study. Therefore, several scholars such as Saunders et al. (2016) suggested different types of sampling technique in order to reduce the number of the population and the ability to generalise the results of the study by providing a representative sample for the whole population. Similarly, Sekaran and Bougie (2016), state that it is important for the researcher to provide a representative sample for the overall population, otherwise the questionnaires' findings that should solve the research problem and achieve the objectives can be considered as unsuitable and inappropriate for the whole population.

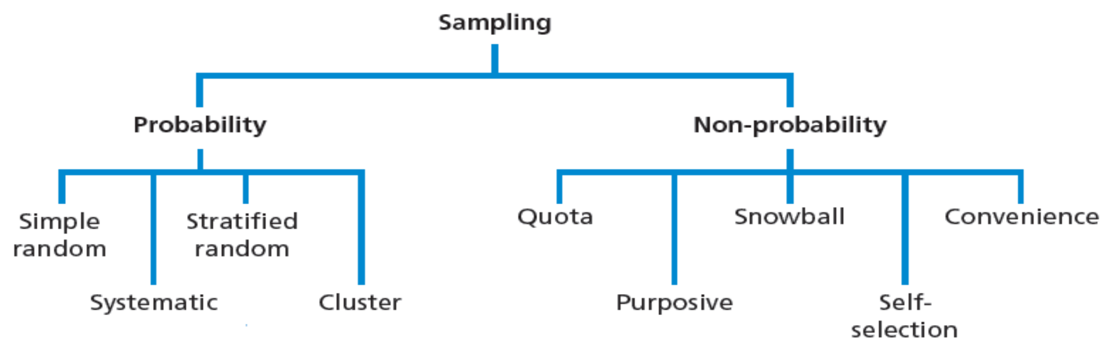
There is a debate in the literature regarding the sampling. As a starting point, Sekaran and Bougie (2016), defined the sample as a number that the researcher could select from the entire population of the study. Another definition by Hair et al. (2010) means that the sample is a segment of a whole population that has been selected to become under investigation by a researcher and it is considered as a subset of the overall population of the study. While most scholars have confirmed the importance of the representativeness for the selected sample, however, there is another crucial issue of the sampling, which is the actual sample size (Bryman and Bell, 2015).

Sample size relies on certain matters such as the available access that the researcher can manage to reach the population of the study and the selection of statistical tests that will be applied in order to achieve the objectives of the study. Therefore, representativeness and size are considered as the most important elements to create and design a subset sample from the whole population (Easterby-Smith et al., 2015). One of the procedures of sampling design is that the researcher has to cover all the characteristics in the population of the study; moreover, the sample size should be adequate and satisfactory in order to confirm that the response rate from the sample is appropriate for the study's population.

In the literature, scholars and researchers have discussed the population and the sampling in depth. Collis and Hussey (2013), state that two concepts of whole population and the sample that can be selected from the population, has the ability to represent the whole population for a specific study and are related to the size of the entire population. If the study's population includes a small number and the researcher has access to reach, the entire population of his/her study then there is no need to design a sample. However, if the study's population includes large numbers of participants and the researcher has limited access to the entire population, then sampling design is required (Ibid). In order to create a sample from a large population, Saunders et al. (2016) proposed two categories for sampling techniques; those are probability (representative sampling) and non-probability sampling.

The first category, which is the probability sampling can be defined when the selection of the sample is known, while the second category can be defined when the selection of the sample is unknown. Moreover, the influence from the study's questions and objectives play an essential role in shaping and designing the sample size and selecting the appropriate sampling technique, which have to become in the end a representative sample for the whole population. The following figure (4.3) shows the different kinds of samples that are available to represent the whole population.

Figure 4.3: The Different Kinds of Samples



Source: (Saunders et al., 2016).

4.11.1.3 Sampling

In general, decisions regarding the sampling method and the minimum sample size required for research purposes are influenced mainly by the availability of resources, specifically, information about the research population frame, and the financial and time resources available to the researcher in order to select the sample as well as to collect and analyse the required data (Saunders et al., 2016).

The population for the current study is all academic staff in the Saudi universities. In 2016, the number of academics reached 54,673 (Ministry of Education Saudi Arabia, 2016). However, the size of the sample for this study will be 397, which has been determined by using Yamane's formula (Yamane, 1967) as verified in the calculation formula below.

Calculation Formula for the Sample Size

- Sample calculation formula for the questionnaire is:

$$n = \frac{N}{1+N(e)^2} \longrightarrow n = \frac{54{,}673}{1+54{,}673(0.05)^2} \longrightarrow n = 397.04 \quad n = 397$$

Where:

n : Sample size   **N**: Population e: Sampling error (usually 0.05 acceptable errors)

Source: (Yamane, 1967).

There are other issues that could affect the sample size such as the adequacy of sample size to perform specific statistical techniques used to analyse research data (Hair et al., 2010; Zikmund et al., 2013; Field, 2013) The researcher has implemented numerous multivariate statistical techniques. Therefore, it is important to select a sample size that is suitable to perform two advanced statistical techniques that have be used in data analysis: Factor Analysis (FA) and Structural Equation Modelling (SEM). According to Hair et al. (2010), the required size to achieve factor analysis is related to the complexity of the research model. Overall, a minimum of 10 cases for each variable to be analysed would be adequate. Moreover, they have mentioned that in the case of SEM analysis, it requires a wider sample compared to other multivariate techniques. Therefore, they recommended a sample of 100 to 400 participations, which would be acceptable in order to apply SEM analysis for any set of quantitative data.

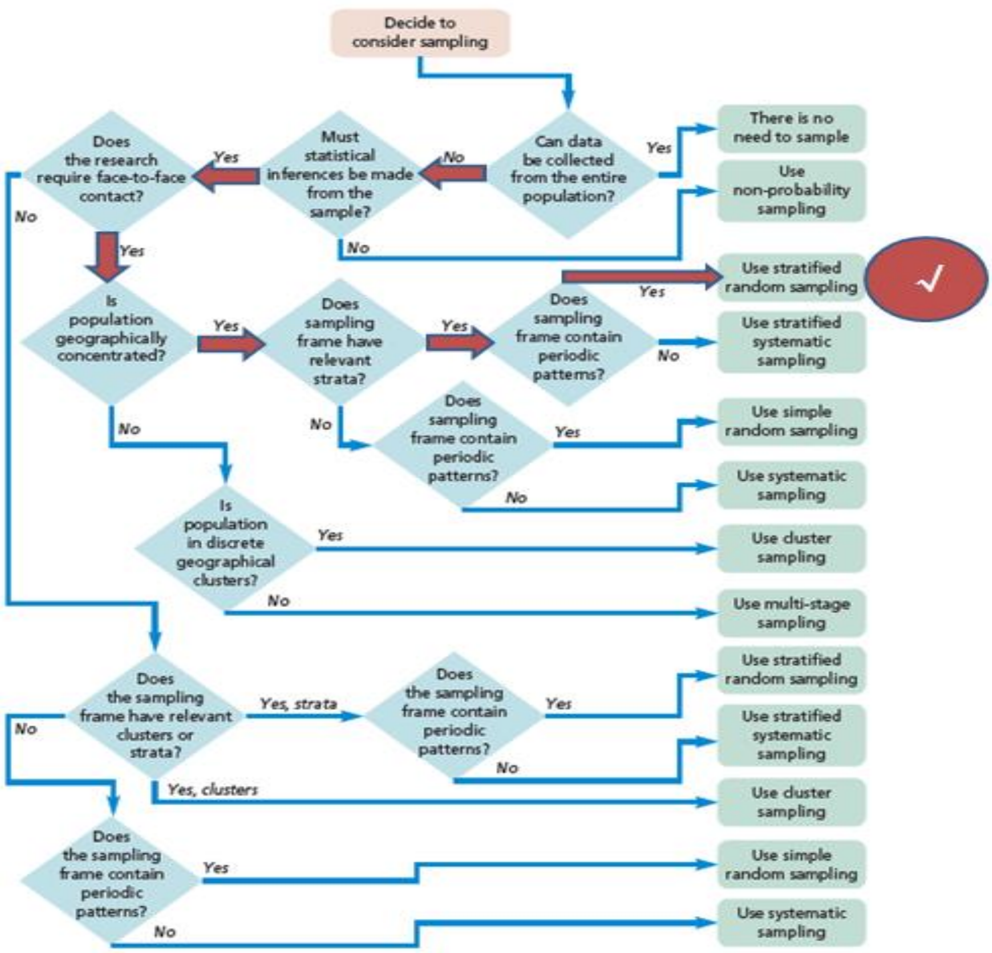
In this study, the number of the sample and the variable match with the suggestion published by Hair et al. (2010). To be more specific, the current research contains a framework of 25 different variables, which gives the opportunity to suggest that the minimum participation required is (25*10) = 250 participants. As can be seen, the recommended sample size is lower than the selected sample size in order to ensure that the multivariate techniques and analysis will not face any problematic issues regarding the sample size for the current study.

4.11.1.4 Sampling Technique

As has been mentioned earlier, sampling falls into two broad categories; probability sampling and non-probability sampling (Blumberg et al., 2011; Zikmund et al., 2013; Bryman and Bell, 2015; Easterby-Smith et al., 2015; Robson and McCartan, 2016; Saunders et al., 2016; Sekaran and Bougie, 2016). This research will be mainly quantitative where questionnaires are used to collect data and while the research aims to provide a deeper understanding of the ERP systems' impact on academics' performance. Hence, it is important to confirm that the researcher will be able to tackle the weakness in the interpretation of some findings. To do that, probability sampling will be used in order to locate the most appropriate sampling technique.

As the current research has considered the academic staff in Saudi universities as the population of this study, therefore, the chosen sampling technique for the quantitative sample was probability stratified random sample (Saunders et al., 2016). The following figure (4.4) explains how to select the most appropriate sampling technique:

Figure 4.4: The Selection of the Sampling Technique



Source: (Saunders et al., 2016).

Based on the sampling technique that has been proposed by Saunders et al. (2016), the researcher has divided the population of the current study into different strata regarding the job title of each academic in order to represent the academics in Saudi universities. The strata/groups of the academic staff's job titles were; professor, associate professor, assistant professor, lecturer, and teaching assistant (Ministry of Education Saudi Arabia, 2016). The following table (4.18) demonstrates the population for each groups/strata in the current study:

Table 4.18: The Respondents Groups for the Questionnaire

	Professors	Associate Professor	Assistant Professor	Lecturer	Teaching Assistant	Total
Population (All Saudi Public Universities)	3521	6807	16434	8338	19573	54673

Source: (Ministry of Education Saudi Arabia, 2016).

Based on the above table that shows the whole population for each group, the researcher has calculated the minimum number of each group that should participate in the questionnaire based on the number of the sample size, which is 397 participants. The following table (4.19) illustrates the required number of participants for each group.

Table 4.19: The Required Number of Participants for Each Group

	Groups Population	Group Rate %	Sample Size for Each Group
Professors	3521	6.4	25
Associate Professor	6807	12.5	50
Assistant Professor	16434	30.1	120
Lecturer	8338	15.2	60
Teaching Assistant	19573	35.8	142
Total	54673	100	397

4.11.1.5 Questionnaire Design

One of the essential processes in data collection is to design and provide the appropriate questionnaire in order to increase the possibility to gather the required data that are valid and reliable. Therefore, Saunders et al. (2016) stated that to confirm the validity and the reliability of the deigned questionnaire, a pilot test should be applied before distributing the final questionnaire to the respondents of the study in order to remedy and enhance the questionnaire effectively, to keep it focused on the research questions and objectives. According to Sekaran and Bougie (2016), the possibility to improve the questionnaire increases if the researcher has designed an appropriate questionnaire that is in line with the objectives of the study, which means as long as the researcher spends time to design the right questionnaire to achieve the study's objectives, the likelihood unrelated data will be collected will be reduced. Additionally, Easterby-Smith et al. (2013) identified five roles, which are very important to be followed while designing the questionnaire of the study. The following table (4.20) describes these roles:

Table 4.20: Five Important Roles in the Stage of Designing a Questionnaire

	Roles	Description
Role 1	**Aiming**	Each statement or question should be written in order to focus on one point only.
Role 2	**Clarity**	Each statement or question should not include colloquial/slang or jargon.
Role 3	**Simplicity**	The language used should be simple and easy to read by different people.
Role 4	**Formulation**	Each statement or question should be formulated to avoid the use of negatives.
Role 5	**Flexibility**	Each question or statement should not be written in a way that forces or leads the participants to select an identical answer.

Source: (Easterby-Smith et al., 2013).

Moreover, other elements have been stated regarding the questionnaire design by Sekaran and Bougie (2016) such as the importance of careful wording, which includes the appropriateness and the language of the statements and the questions, using the appropriate format for the statements, writing the statements or the questions in sequence and finally including the demographic questions such as the personal questions, which relate to the participants. Indeed, Easterby-Smith et al. (2013) and Sekaran and Bougie (2016) agreed that using the appropriate type and format of questions are the most substantial elements in the design of a suitable questionnaire for the study under research. Regarding the two elements above, there are two kinds of questions or statements that can be included in the questionnaire: open and closed questions. According to Oppenheim (2000), the first kind of question, which is the open form, is usually used by researchers who adopted the qualitative method to allow the participants to provide answers that are not arranged in scale or in any other prescribed form. The second kind, which is the closed question, provides a scale of answers or even two choices such as Yes or No to be ticked by the participants. As to which one of the questions types is the most appropriate, Collis and Hussey (2013) stated that the chosen philosophy of the study decides which type is suitable. The positivism philosophy tends to apply closed questions, whereas, the interpretivism philosophy prefers the open question type. Saunders et al. (2016) indicated that there are six different types of closed questions. The following table (4.21) shows the six different options of closed question types:

Table 4.21: The Different Options Regarding the Closed Questions Type		
Option	**Type**	**Description**
1	**List Questions**	When the researcher provides a set of answers that the participants can select one or more from
2	**Category Questions**	When there is only one item selected
3	**Ranking Questions**	When the researcher provides a set of answers and the participants have to select them all in order, based on his/her opinion
4	**Rating Questions**	When the researcher provides a scale of five, six or seven-point rating scale and the participants have to select one point in each scale
5	**Quantity Questions**	When the researcher asked the participants to give the amount of characteristics on behaviour or attribute data
6	**Matrix Questions**	When the researcher allows the participants to select more than one answer in each question for the purpose of analysis

Source: (Saunders et al., 2016)

Therefore, based on the above discussion, the current study has applied the closed type of questions by providing two commonly used options, which are rating questions and category questions. In the case of the rating questions, a Likert-scale has been applied for all the rating questions in order to gather the academics' views regarding the factors that impact their performance while they are using the ERP systems in their universities (Easterby-Smith et al., 2015; Saunders et al., 2016). Moreover, the second option, which is the categorical questions have been used to support the rating questions and to approve the representativeness of the sample for the study's population.

Additionally, Sekaran and Bougie (2016) stated that there are two more important issues that need to be considered by any researcher. Those issues are the wording of each question since there are cultural differences and the second issue is the sequencing of the questionnaire questions. Therefore, the researcher has considered the wording for all the questions and ensured that all the wording in the questionnaire reflects the purpose of the current study. Regarding the second issue, the researcher has adopted the suggestions by Sekaran and Bougie (2016) to apply the funnel approach, which arranges the questions to start by the easiest and end with the difficult, so the questionnaire takes a smooth character for the participants of the study. Finally, the questions/statements have been derived from three widely used models in the literature. The section which considered the academics' performance was adapted from the Delone and McLean information systems success model. The system quality section was adapted from the End-User Computing Satisfaction model, which has been proposed by Doll and Torkzadeh (1989) and the Task-Technoloy Fit model, which has been proposed by Goodhue (1995). Finally, the service quality section was adapted from the updated Delone and McLean Information Systems success model.

4.11.1.6 Questionnaire Structure

The debate regarding the ideal questionnaire structure and length began decades ago. Dillman (2007) stated that the length and the structure of the questionnaire play a very important role, declaring that the shorter the questionnaire is, the higher the response rate will be. However, it is also essential to address all the perspectives of the study that will lead the researcher to achieve the objectives of the study. The participants must also be fully informed about the aim, objectives and the research topic in order to ensure that they will deliver the right knowledge, which will help the researcher in the analysis and discussion stages. Therefore, in the current study the researcher has added a cover page for the questionnaire and called it Participants' Information sheet. This sheet provides the participants with particular details regarding the current study to build an overview of the study in their minds. The particular details include the title of the study, an invitation statement to take part in the study, the purpose of the study, participants' rights, the length and the approximate time needed to complete the questionnaire, the risk involved from participation, confidentiality, and finally the inclusion and the exclusion criteria for the questionnaire. Moreover, the participants will be asked if they wish to receive a report of the final finding of the study to be sent by post or email.

Regarding the organisation of the questionnaire's sections, the questionnaire has been divided into four sections; the following table (4.22) describes the four parts of the questionnaire:

Table 4.22: The Description of the Four Sections in the Questionnaire

Section	Name	Description
Section One	**General Information or "Participant's Profiling Questions"**	This section includes the demographic questions about the study participants such as gender, job title, academic qualification and years of experience
Section Two	**Performance Impact**	This section refers to the effect of the ERP systems on the individual, and assesses how the use of the ERP systems has increased productivity, capability and effectiveness for academic staff.

Section Three	**System Quality**	This section refers to the performance characteristics of the ERP systems. It measures the performance of the ERP systems from the technical and design perspective.
Section Four	**Service Quality "Technical Support"**	This section refers to the quality of the support that system users receive from the ERP systems department and IT support.

4.11.1.7 Ethical Considerations

There is no doubt that addressing the ethical considerations is an important process in order to confirm the confidentiality for all participants. Therefore, Saunders et al. (2016) affirmed that the ethical dimension for the different kinds of data collection is essential to ensure that no harm would affect the privacy of each individual participant. Henning et al. (2004) stated that any researcher must apply for ethical approval through the authorised department in the institute or the organisation in the early stage of the research before starting to collect any of the research data. Therefore, the proposal for the current study has been submitted to the Liverpool John Moores University (LJMU) Research Degree Committee (RDC) to apply for the data collection permission. In order to receive permission from the Ethics Research Committee at LJMU, three steps have been undertaken. Firstly, the researcher has requested an official letter from the Saudi Arabian embassy in London, confirming the identity of the researcher and some information such as a declaration that the researcher is one of the students sponsored by the Saudi government. Secondly, the researcher has sent an email to several universities requesting a gatekeeper, which would allow the researcher to use the universities' facilities. Finally, the researcher has submitted the ethical form and attached all the supporting documents to the ethical committee at LJMU. On 14th November 2014, the researcher was granted approval (with reference number: 14/LBS/015) and since that period, the data collection of the study commenced.

Additionally, the ethical approval forces the researcher to include different statements, which have to be presented on the first page that will be attached with the questionnaire. Those statements include that any participant has the right to refuse participation or withdraw his/her participation at any time of the research process. Moreover, all the provided information and knowledge will be treated confidentially throughout all the research stages. Another point that must be presented is that providing information about the nature of the research as well as a consent form to be signed whether individually or by a gatekeeper who will be the person that gives access to the research participants.

4.11.1.8 Questionnaire Translation

The majority of the academic staff in Saudi universities who are considered as the population of the current study have Arabic as their mother/first language. Therefore, it was very important to translate the questionnaire from English into an Arabic version in order to make it easier to read and answer. However, it is vital that the researcher ensures the meaning for both versions is similar to each other and both questionnaires convey the same questions and knowledge to all participants. Thus, the procedures to translate the original version of the questionnaire to other languages must be undertaken carefully (Saunders et al., 2016). Moreover, Usunier (1998b) stated that different matters should be considered by the researcher in order to translate the questionnaire of any study; those matters are the lexical, idiomatic, experiential meaning, grammar and syntax. Additionally, Usunier (1998a) highlighted different techniques that can be used by any researcher in order to ensure a clear, understandable and unbiased version of the translated questionnaire. The following table (4.23) describes the different translation techniques:

Table 4.23: The Different Translation Techniques

Techniques	Style	Advantages	Disadvantages
Direct Translation	Source questionnaire to target questionnaire	Easy to implement and relatively inexpensive	Can lead to many discrepancies (including those relating to meaning) between source and target questionnaire
Back-Translation	Source questionnaire to target questionnaire to source questionnaire; comparison of two new source questionnaires; creation of final version	Likely to discover most problems	Requires two translators, one a native speaker of the source language, the other a native speaker of the target language
Parallel Translation	Source questionnaire to target questionnaire by two or more independent translators; comparison of two target questionnaires; creation of final version	Leads to good wording of target questionnaire	Cannot ensure that lexical, idiomatic and experiential meanings are kept in target questionnaire
Mixed Techniques	Back-translation undertaken by two or more independent translators; comparison of two new source questionnaires; creation of final version	Ensures best match between source and target questionnaires	Costly, requires two or more independent translators. Implies that the source questionnaire can also be changed

Source: (Usunier, 1998a).

Based on the advantages and disadvantages presented in the table above regarding the different techniques of translation, the researcher has used the back-translation technique. Therefore, the questionnaire of the current study has been processed in two stages. The first stage involves translating the original version from English into Arabic and then the second stage involves translating the questionnaire backwards from Arabic to the English version until the final draft of the Arabic questionnaire is deemed satisfactory and acceptable.

4.11.1.9 Pilot Test

Arain et al. (2010) defines a pilot study as a small study that help researchers to design a further confirmatory study. Many researchers and scholars have confirmed the importance of applying a pilot test to the questionnaire before its final distribution to the study's sample. Saunders et al. (2016) stated that in order to ensure that the instrument of the study is considered as a good instrument, conducting a pilot test is essential in this case. The need for a pilot study can be explained by the several advantages that could be added to the questionnaire (Teijlingen and Hundley, 2001; Yin, 2013). Those advantages are as follow: (1) enhancing the understandability of the questionnaire by improving the wording of some questions not clear to the participants; (2) excluding some questions that are not related to the study based on the participants' knowledge and opinions; (3) measuring the validity and the reliability in advance before distributing the questionnaire; (4) Confirming that the questionnaire is considered an appropriate instrument and will lead the researcher to achieve the study's objectives and aim; (5) improving the plan for the data collection and remedy any confusion or error in the researcher instrument; (6) providing an opportunity for researchers to clarify and ensure the validity for the measurement instrument especially with studies that collect data from a big sample size.

In this respect, the researcher has applied several steps in order to confirm the ability of the questionnaire to address the objectives of the current study. Firstly, three experts in the field of Information Systems have reviewed the questionnaire, two of them are working in Saudi universities and the third one is a PhD candidate at LJMU. They gave some feedback such as concerning the name of the systems, which is ERP systems, where they suggested it would be better to replace it with the word Anjez Systems or Oracle Systems in the Arabic version of the questionnaire; their justification was that the two above names are the most popular among academics in Saudi universities.

The second step is to distribute 38 questionnaires randomly to a small group from the study’s population and request the piloted group to return with any feedback/recommendations in order to improve the instrument of the data collection. Moreover, Saunders et al. (2016) suggested that the researcher could ask the piloted group other feedback such as time taken to complete the questionnaire, if there are any confusing questions or unclear statements and give feedback from their professional opinion if there is any problematic errors in any question or statement that would not help the objectives and the aim of the study in order to increase the response rate.

The third step is to collect the distributed questionnaire from the piloted group within 40 days. This took place from the middle of July 2015 until the 24th of August 2015. The feedback received was helpful for the researcher to improve the questionnaire of the study. The supervisory team have suggested adding the enforced point in the five Likert scale in order to improve the accuracy of the data collection. Moreover, providing a brief description for each section in the questionnaire would be helpful to ensure that participants understand each section’s aim.

4.11.1.10 Questionnaire Administration

In view of the fast internet connection and the good services provided by the postal department in the Saudi universities, the researcher depended on these two channels to distribute to, and later collect the questionnaire from, the participants of the current study. In order to increase the response rate, the researcher used social media such as Facebook and Twitter to send an earlier notification about the importance of the study and the value that can be added from the current study to all the academic staff as has been suggested by Blumberg et al. (2011).

Additionally, the researcher has followed other recommendations of several scholars (such as Oppenheim, 2000; Blumberg et al., 2011; Sekaran and Bougie, 2016; Saunders et al., 2016) in order to maximise the response rate such as applying the three steps that have been explained above in the pilot test, attaching the participants’ information sheet to provide a brief summary of the study and finally follow-up the distribution and collection processes by the researcher himself and always be connected with the researcher’s assistants in order to solve any problem that might occur.

4.11.1.11 Reliability and Validity of the Questionnaire

The reliability and the validity of any questionnaire are essential in order to achieve accurate and sufficient findings (Hussey and Hussey, 1997). Several scholars and researchers have affirmed the importance of the pilot study processes such as Clark-Carter (2004) and Cozby (2007). They stated that in order to propose a good quality research, it important to apply both reliability and validity processes to ensure that the data collection instrument is appropriate for the conducted study.

Reliability can be defined as the extent to which the data collection technique or techniques will yield consistent findings (Hair et al., 2010). All studies require undertaking a reliability examination in order to confirm that all the findings of the collected data are reliable. There are several debates in the literature regarding reliability. Sekaran and Bougie (2016) stated that when a researcher uses any tool such as a questionnaire to collect data, the tool should not be biased. Moreover, it should provide consistent results, which will raise the assurance of reliability of the implemented measure. Similarly, Leedy and Ormrod (2005) stated that in order to confirm that the collected data will provide significant statistical result; researchers have to use the most appropriate method to collect the data. Thus, based on the chosen method, the researcher has to select the most suitable type of validity, such as internal or external validity, content validity, construct validity, and face validity, which can be related to the different kinds of methods (Cohen et al., 2011; Sekaran and Bougie, 2016). Walliman (2011) and Field (2013) debated that it is difficult to guarantee data that are 100% accurate from the research instrument particularly in the field of social science. Therefore, the researcher in the current study has conducted two stages for the reliability test in order to maximise the reliability of the results and to assess the stability of the measure. The first stage was to conduct a pilot study on a small number of participants to ensure that the designed questionnaire has the ability to achieve the aim and the objectives and then test the validity and reliability of the collected data that have been gathered by the research instrument. The second stage was to conduct a reliability test on the main collected data to confirm that the main data are reliable as well.

Additionally, based on the recommendation of Sekaran and Bougie (2016), the researcher has applied the Cronbach Alpha test, which is considered as one of the most effective ways to assess the reliability of the instrument. The Cronbach Alpha test has different accepted readings among researchers. However, the most popular accepted reading for a good outcome is (0.70) and higher; less than that can be considered as a poor reading. In this respect, the present study has applied the Cronbach Alpha test in both the pilot test and the main study data collection. The test has been applied in three steps in order to maximise the reliability of the data collection. In this section, the researcher has explained the three stages of the Cronbach Alpha test that were applied to the pilot study only, while the other three stages of the Cronbach Alpha test that were applied on the main data collection will be discussed in the next chapter, the analysis chapter. The first stage is by including all the scales questions in one Cronbach Alpha test to provide an overall outcome for all of the questions combined together. The second stage is by dividing the questionnaire into four sections, while only the three sections, which include the scales questions, will be tested. The last stage is by dividing the questions within the related factors of each one of them, which will significantly emphasise the reliability of the used instrument. The following table (4.24) demonstrates the results of the Cronbach's Alpha test for the pilot study:

Table 4.24: The Three Stages Applied Regarding the Cronbach's Alpha Test to the Pilot Study

Stages	Constructs	Items	Cronbach's Alpha	Notes
Stage (1)	Overall	71	**0.936**	**Accepted**
Stage (2)	Section Two	10	**0.907**	**Accepted**
	Section Three	41	**0.889**	**Accepted**
	Section Four	20	**0823**	**Accepted**
Stage (3)	Ease of use	4	**0.891**	**Accepted**
	Accessibility	3	**0.881**	**Accepted**
	Assistance	2	**0935**	**Accepted**
	Authorization	2	**0.757**	**Accepted**
	Flexibility	2	**0.891**	**Accepted**
	Training	3	**0.818**	**Accepted**
	Accuracy	2	**0.793**	**Accepted**
	Compatibility	4	**0.904**	**Accepted**
	Currency	3	**0.748**	**Accepted**
	Right data	3	**0.802**	**Accepted**
	Lack of confusion	2	**0.757**	**Accepted**
	Timeliness	4	**0.808**	**Accepted**
	Content	4	**0.923**	**Accepted**
	Format	3	**0.932**	**Accepted**
	Reliability	5	**0.756**	**Accepted**
	Responsiveness	4	**0.933**	**Accepted**
	Assurance	3	**0.767**	**Accepted**
	Empathy	4	**0.828**	**Accepted**
	Tangible	4	**0.705**	**Accepted**

Source: Created by the researcher.

To conclude, in the current study the researcher has applied several steps to ensure that the collected data genuinely reflect the topic of this study, which is the ERP systems impact on the academics' performance in Saudi universities. The first step was to review a comprehensive literature regarding the field of information systems and ERP systems, and undertake a theoretical framework to implement it through the rest of the study. The second step was to choose the most appropriate methodology and method suggested by the most popular researchers and scholars, especially in social sciences and business management, which played an important role in achieving the aim and objectives of the current study. The following step was to design and select the suitable sample size that can be considered as a representative sample for the whole population. The next step was to test the internal, external, content and face validity of the researcher's instrument in order to confirm that the instrument was able to carry on and able to collect the appropriate knowledge. The final step was to conduct the Cronbach's Alpha test in order to show that the reliability of the questionnaire reached the score of (0.70) or higher. The following table (4.25) summarises the applied procedures in order to ensure the validity and the reliability for the quantitative and the qualitative data:

Table 4.25: Validity and Reliability of the Quantitative and Qualitative Data

Procedures	Quantitative	Qualitative
Format	Structured Questionnaire. Questions have been designed based on the related literature and previously validated questionnaires.	Semi-structured interviews. Questions have been written based on the results of the quantitative data analysis and discussion.
Language	The questionnaire has been translated into Arabic by independent professional translators. This is because the main language for the targeted sample is Arabic.	The qualitative questions for the interview questions have been translated into Arabic by an independent professional translator. This is because the main language for the two universities is Arabic.
Review	Questions have been reviewed by a number of academic researchers who are experts in Arabic language translation in three universities (LJMU – UK), (King AbdulAziz University – Saudi Arabia), and (Taibah University – Saudi Arabia).	Questions will be reviewed by a number of academic researchers who are experts in Arabic language translation in three universities (LJMU –UK), (King AbdulAziz University), and (Taibah University – Saudi Arabia).
Accuracy	The questionnaire has been piloted; the purpose of the pilot test is to ensure that the respondents understand the questions. 38 academics from Saudi universities participated in the pilot study and provided some suggestions, which were considered in constructing the final version of the questionnaire (appendix 2).	

Reliability	Cronbach's alpha has been used to check reliability of quantitative survey data. In order to find out if the questions of the questionnaire have a consistency, Cronbach's Alpha for the piloted survey has been calculated using SPSS 23. After applying some minor modifications, the overall consistency was reported as 0.955, which is assumed acceptable value ($\alpha \geq 0.7$).	Methodological and data triangulation will be used to check the reliability of mixed and qualitative data. Moreover, increasing interviews' reliability will be achieved by following a standardized process in recording, writing, and interpreting the obtained data.
Information Sheet	Both questionnaire and interviews participants will be provided with an information sheet to let them have better understanding of the research objectives and any further needed information.	

Source: Created by the researcher.

4.11.1.12 Statistical Tests Employed

The selection of the statistical analysis must be linked to the objectives of the study. This is because there is a large number of statistical tests, which can be implemented especially if the collected quantitative data is large. In general, there are two kinds of test, descriptive and inferential test. The current study assesses the differences between the different groups and assesses attitudes of the academics in Saudi universities about the significant factors that impact their performance while using the implemented ERP systems; therefore, the researcher has used both kinds of statistical tests in order to provide recommendations and conclusions from the collected data.

Additionally, the statistical test can be divided into two kinds, parametric and non-parametric tests. Each one of them has its own features and characteristics that make it more suitable and appropriate to a specific kind of question. Some scholars such as Field (2013) believe that the parametric test is more powerful than the other kind of test. However, other researchers (such as Siegel and Castellan, 1988; Gravetter and Wallnau, 2016) believe that the non-parametric tests are considered as equally important as the parametric tests. This is in reference to some studies such as social sciences, where it is not easy to collect data that can be analysed by parametric tests.

Based on the above discussion, in the present study several statistical analysis techniques such as descriptive analysis and means frequencies have been applied to the collected data in order to analyse the different participant groups' "demographic/profiling data" and provide expressive and readable results. Moreover, parametric tests such as the Independent Sample t-test and one-way ANOVA have also been applied. Finally, the researcher has exported the collected dataset from the questionnaire instrument into two statistical programmes in order to derive accurate and effective results for the study. These two programmes are the Statistical Package for Social Sciences (SPSS 23) and Analysis of a Moment Structures programme (AMOS 23). For the qualitative data, the researcher has used the NVivo 11 programme in order to organise and analyse the dataset that has been gathered from the semi-structured interviews. The following sub-section will briefly describe the tests that have been applied in the current study and their results will be presented in the following chapter, which is the analysis chapter.

4.11.1.13 Parametric Tests

In the current study, the researcher has applied two main tests (Independent Sample t-test and one way Anova) in order to highlight the differences between the groups. Moreover, descriptive analysis has been applied to confirm the representativeness for the sample size for the whole population. The above mentioned tests have only been applied to the demographic questions, which total seven questions related to the academics' profiling in Saudi universities.

4.11.1.14 Factor Analysis

Fabrigar et al. (1999) stated that factor analysis can be considered as one of the multivariate statistical techniques, which has the ability to reduce the dataset into certain constructs that are related and correlated together in order to increase the understanding of the questionnaire variables under study. Similarly, Field (2013) agreed that the main purpose for the factor analysis test is to explain and increase the understanding of the collected data; therefore, the factor analysis test depends on classifying the data set into certain groups (Ibid). Another functional purpose is to reduce the collected data to small sets in order to make it easier and manageable for the researcher to ensure the collected data, and the proposed constructs from the questionnaire are measuring what they have been designed for. Pallant (2016) confirmed that the factor analysis test has the ability to reduce a large dataset into certain factors, which emerge as clusters. The clustering process depends on the factor loading of each item in the dataset and after that setting, the correlated items in one appropriate construct as one group.

4.11.1.15 Cronbach's Alpha

In the literature, there are two main tests regarding the reliability of a dataset. According to Pallant (2016), the two kinds are the test-retest reliability and the internal consistency reliability. Those kinds of reliability provide an answer to the researcher if the collected data can be interpreted consistently on two subsequent occasions or there are several questions in the instrument of the researcher that are not reliable to the study (Field, 2013). Moreover, Sekaran and Bougie (2016) added another benefit by stating that the reliability and the validity can assess the quality of the collected data. Also, Sekaran and Bougie have indicated that the affirmative associations among variables within a dataset can be assessed by Cronbach's alpha test, which is considered as a reliability coefficient test. Therefore, Field (2013) stated that it is essential to apply the reliability analysis on the collected data by performing the reliability coefficient test (Cronbach's alpha) in order to assess the reliability of the scale items. Moreover, the outcome of the Cronbach's alpha test must be around the accepted score, which is (0.70) or higher. Another opinion regarding the accepted score has been highlighted by Sekaran and Bougie (2016); the accepted score for Cronbach's alpha outcome starts from (0.60) and above. However, the accepted score could be lower if the assessed variables are less than 10 items (Pallant, 2016).

4.11.1.16 Kaiser-Meyer-Olkin (KMO) and Bartlett Test of Sphericity

According to Pallant (2016), in order to ensure that the dataset is suitable for the factor analysis test, there are two main tests which have to be applied. Those two statistical tests are the Kaiser-Meyer-Olkin Test (KMO) and Bartlett's Test of Sphericity. Regarding the KMO test, the outcome value has to be in the range of 0 to 1, as the higher value is more suitable for the dataset to be performed by factor analysis test (Field, 2013). There is a proposed classification for the KMO output by Hutcheson and Sofroniou (1999), and the following table (4.26) shows the KMO outcome classification:

Table 4.26: The Classification of the KMO Outcome Value

KMO Value	Classification
(0.50) or less	Unacceptable
(0.60) to (0.69)	Mediocre
(0.70) to (0.79)	Middling
(0.80) to (0.89)	Meritorious
(0.90) to (0.1)	Marvellous

Source: (Hutcheson and Sofroniou, 1999).

The second test according to Pallant (2016) is Bartlett's Test of Sphericity, which demonstrates the collected data to be suitable for further analysis if the result of the p-value is ($p < 0.05$). Moreover, Field (2013) stated that if the value of Bartlett's Test of Sphericity is $p < 0.00$ that means the variables are significant and therefore the principal component analysis is considered as acceptable.

4.11.1.17 Total Variance Explained

The main aim for the total variance explained is to find an explanation for the identified variance during the factor analysis. Hair et al. (2010) stated that total variance explained depends on the eigenvalue, as the total of squared loading for a construct; moreover, it depends on the latent root. Additionally, the total variance explained represents the amount of variance accounted for by each factor. The score for the eigenvalue must be 1.0 or higher to be considered as significant for factor analysis and any score less than 1.0 will be refused (Pallant, 2016). The highest eigenvalue always explains the highest percentage of the variance and the lowest eigenvalue always explains the lowest percentage of the variance, which means every time the eigenvalue for a factor decreases, the percentage for the variance explained will be decreased too.

4.11.1.18 Communalities

Communality can be defined as the total number of variance an original variable shares with the rest of the other variables, which are included in the analysis (Hair et al., 2010). According to Field (2013), variables are linked to three different kinds of variance; those types are common, unique and random variance. The following table (4.27) describes the three different types of variance.

Table 4.27: The Three Types of Variance Related to Variables

Type	Name	Description
First Type	**Common**	When the variances are shared with the other variables
Second Type	**Unique**	When the variances are only specified and reliable to the measured variable only.
Third Type	**Random Variance**	When the variance cannot be clarified by its relationship with the other variables, this is because the collected data are not reliable to each other.

Source: (Field, 2013)

Indeed the proportion for the first variance type, “common variance,” can be called communality. Thus, the principal factor analysis presumed that all variables are common variances. Additionally, Hair et al. (2010) highlighted different recommendations regarding the accepted value for the communalities. If the sample size is one hundred (100) or less then the accepted value started from (0.60) or higher; if the sample size is around 101 to 150 then the accepted communality value is equal to (0.50); and finally if the sample size reaches 300 or above then the accepted value should be no less than (0.45).

4.11.1.19 Scree Test

This test provides a graph that includes the eigenvalues, which allows the researcher to track the curve in order to point the elbow and count all the factors demonstrates above the elbow of the curve that can be highlighted in the graph, which have received high eigenvalues (Field, 2013; Pallant, 2016). This test plays an important role to confirm the number of factors that can be used in further analysis. Moreover, it can easily clarify the factors in one small graph, which make it easy to read and understand.

4.11.1.20 Structural Equation Modelling (SEM)

Structural Equation Modelling (SEM) has developed from being only a statistical technique for insiders to become a valuable tool for a broad scientific public (Nachtigall et al., 2003). According to Lei (2004), SEM can be defined as a class of methodologies that attempts to represent hypotheses about the means, variances and covariance of collected data in terms of a minor number of 'structural' parameters, known as a hypothesized underlying model. SEM includes multiple techniques working all together under one umbrella. Therefore, SEM is often known as LISREL models, which means Linear Structural Relations (Nachtigall et al., 2003). There are several advantages related to SEM such as it has the ability and the statistical power to compare the model to the collected empirical data, which leads to outcome results for different model fit indices that allow a researcher to accept or reject the proposed model. Another advantage is that SEM assumes the correlation between the latent and the observed variables as well as the assumed dependencies between the various latent variables (Raykov and Marcoulides, 2012). In this case, if the most common indices have shown accepted values for the model fit, then SEM can be considered as a confirmatory factor analysis. On the other hand, if some of the indices were not accepted it could only be called a structural equation model (Joreskog et al., 2001).

4.11.2 Qualitative Data Analysis

4.11.2.1 Semi-Structured Interviews

There are many arguments in the literature regarding the interview instrument practice in order to collect qualitative data. Ghauri and Gronhaug, (2005) stated that the interview is one of the important and valuable instruments that can be used to collect in-depth, reliable and valid data, related to a particular study in order to achieve its objectives and answer its questions. According to Blumberg et al. (2011), interviews can be classified into three types, those types are structured, semi structured and unstructured (in-depth). The three different types of interview depend on the interaction of the researcher in the procedure of the interview. The first type, which is the structured interview, includes closed questions or pre-determined questions such as the questions provided by a questionnaire or when a researcher asks the interviewees a particular list of questions. Moreover, in this kind of interview, the investigator has to ask the questions and write or record the answers (Saunders et al., 2016). The second type is the unstructured interview, which includes open questions and it is considered as a non-standardised process. It allows a researcher to keep control of the interview and the contributors to direct the conversations (Thomas, 2011; Easterby-Smith et al., 2015). The third type is the semi-structured interview; it may provide an opportunity for better participation from the interviewee, and it allows the investigator to make a combination of both structured and unstructured interviews questions.

According to Blumberg et al. (2011), the semi-structured and the unstructured types of interview are the most commonly used by researchers who have adopted the qualitative method for their studies. This is because a researcher establishes the interview by asking general questions about the participants and after that engages the participants in a particular conversation dialogue, which could present a new idea, problem or potential solution. However, the unstructured interview might not establish a particular topic or questions; this is because it allows the participants to control the whole conversation and the discussion.

The main difference between the semi-structured and unstructured interview relates to the range of discussion. The semi-structured interview has to follow the provided themes of questions that have been designed by the researcher, which keeps the discussion mostly under the control of the interviewer; on the other hand, the unstructured interview based on an open discussion starts by a general conversation about a theme and afterwards the interviewee controls the rest of the conversation (Blumberg et al., 2011). The following table (4.28) explains the differences between the structured and the semi-structured or the unstructured interviews.

Table 4.28: The Differences Between the Structured and Semi-Structured or Unstructured Interview		
Criteria	**Structured Interview**	**Semi-Structured or Unstructured Interview**
Type of Study	Explanatory or descriptive	Exploratory and explanatory (semi-structured)
Purpose	Providing valid and reliable measurements of theoretical concepts	Learning the respondents' viewpoints regarding situations relevant to the broader research problems
Instrument	Questionnaire (specific set of predefined questions)	Memory of list interview guide
Format	Fixed to the initial questionnaire	Flexible depending on the course of the conversation, follow-up and new questions raised

Source: (Sekaran and Bougie, 2016).

Additionally, it is important to highlight the main advantages and disadvantages regarding the different techniques of interviews in order to select the most appropriate one for the current study. Therefore, the following table (4.29) summarizes the most important advantages and disadvantages for the commonly used interview techniques; these are personal (face-to-face) interview and telephone interview.

Table 4.29: The Advantages and Disadvantages for the Different Techniques of Interviews		
Type	**Advantages**	**Disadvantages**
Face-to-Face Interviews	-Can establish rapport and motivate respondents. -Can clarify the questions, clear doubts, add new questions. -Can read non-verbal cues. -Can use visual aids to clarify points. -Rich data can be obtained.	-Respondents may be concerned about confidentiality of information given. -Interviewees need to be trained. -Can introduce interview biases. -Respondents can terminate the interview at any time. -Take personal time. -Costs more when a wide geographic region is covered.
Telephone Interviews	-Less costly and speedier than personal interviews. -Can reach a wide geographic area. -Greater anonymity than personal interviews.	-Non-verbal cues cannot be read. -Interviews will have to be kept short. -Obsolete telephone numbers could be contacted, and unlisted ones omitted from the sample.

Source: (Sekaran and Bougie, 2016).

In the present study, the researcher has adopted the semi-structured interview in order to gain a deep understanding and an insight into the impact of ERP systems on academics' performance in Saudi universities, and the factors that highly impact the academics while using the ERP systems in their universities.

Several researchers in the literature have agreed that using interviews is essential with people who have a busy schedule such as executives and high profile individuals. This is because it could be impossible for the researcher to meet them more than once; therefore, recording and collecting as much information as possible is required (Blumberg et al., 2011; Bernard, 2013). Additionally, by creating an organised schedule for the interviews, this will give a good impression for the interviewees that the researcher is not wasting their time.

According to Bryman and Bell (2015), telephone interviews are usually shorter than face-to-face interviews. However, the current study has used a combination of face-to-face and telephone interviews based on two main reasons, which are the time limitation for the current study and the busy schedules of some interviewees.

4.11.2.2 Sample Selection and Profile of Interviewees

There is no doubt that choosing the appropriate sampling technique is essential in qualitative methods as much as quantitative methods. The sample selection for qualitative study depends on the reliability, credibility and validity of the research (Bernard, 2013). In addition, according to Ghauri and Gronhaug (2005), the interview questions have to be designed in a particular form such as "who" and "how".

The current study is aimed at the academics in Saudi universities as a target to gain more knowledge about the ERP systems' impact on their performance. Thus, regarding the sampling technique, the researcher has implemented a non-probability sampling technique in order to conduct the interview. To be precise, the current study applied the purposive sample method in order to choose the size of the interview sample. This is because purposive sampling is considered as an approach, which allows the researcher to target the contributors who have the knowledge and are able to understand the interview questions and they have the ability to answer them according to their experience (Easterby-Smith et al., 2015).

The selection of the purposive sample in the present study depends on two criteria; the first criterion is related to the academic's positions, for instance, academics who occupy senior positions such as the Dean of Information Technology (IT Manager) and other Colleges Deans. The second criteria is that the selected sample have at least one year's experience in their positions in order to ensure that they have the minimum required knowledge to answer the interview questions. There are many arguments in the literature regarding the number of interviews that should be conducted in any study. According to Bernard (2013), the researcher has to conduct at least six interviews as the minimum number. In the present study, the researcher has planned to interview nine academics in order to target a fair number of interviewees that could be considered as representative of the whole sample. However, the total number of academics who accepted participation in the study were just six academics, which is considered as the minimum number according to Bernard (2013).

4.11.2.3 Conducting the Interviews

This section represents the processes that the researcher has followed in order to conduct the interviews for the current study. The following points summarize the procedures that have been followed to conduct the interviews:

- Firstly, the researcher has navigated different implemented ERP systems in various universities in order to check the services and the interface of these systems.
- Designing a schedule table that could organise the details of the interviewees effectively to avoid any mistakes that would disturb the participants. Examples of the details that are included in the schedule table are the preferred contact number/e-mail, the place of meeting, the time of meeting and which kind of interview, either face to face or telephone interview.
- From the total expected number of nine interviewees, only six academics have accepted and confirmed their participation; therefore the six interviewees have been added to the schedule table.
- The six interviews were conducted during a specified period of time, which is between July 2016 and January 2017, in order to take into account the participants' busy schedules.
- The time for each interview was identified as approximately forty-five minutes to one hour as all participants have been notified.
- The researcher carried a recording device in order to record the interviews. However, three of them were not recorded based on the participants' request. The reasons for their rejection is that the recording increases their stress, therefore, the researcher has responded to their wishes.

- Preparing note making sheets, which allow the researcher to take intensive notes and comments from the participants to assist the subsequent transcription and simplify the search process for the data.
- Preparing a welcoming and brief abstract about the current study, and explaining how their participation may benefit the current study as well as all other academics.
- Confirming that for all interviewees the provided information and participation will be confidential and safe, and the information will only be used by the researcher in the current study.
- The names of the participants will be kept anonymous; therefore, the researcher will use an alphabetical sequence that replaces the name of the participants.
- Translating the prepared questions into the Arabic language, this is because the mother language for all participants is Arabic. Moreover, the researcher has ensured that all questions are understandable and reflect the English version of the interview questions.
- Translating the recorded interviews into English as well as writing notes in order to be used in the qualitative analysis and discussion.

In the current study, there are four themes: questions related to the demographic data; questions related to the academics' performance and finally questions related to the systems and service quality dimension. The previous point has ensured that the interview will be under control by the researcher and the participants will be aware of the interview nature, which helps to reduce any confusion for both the investigator and the interviewees.

The above procedures have assisted the researcher to set a good tone and environment from the beginning of the interview, in order to ensure that the conversation will collect and observe as much knowledge as possible regarding the impact of ERP systems on academics' performance in the context of Saudi universities. While the number of the participants was less than the expected number, however, regarding the time limitation for the researcher and the refusal of some academics to participate face-to-face or via the telephone, the conducted interviews were performed well and can be accepted as representative. Moreover, the conducted interviews facilitated the triangulation of the collected quantitative data.

4.11.2.4 Interview Data Analysis

The main reason for using the semi-structured interviews as has been mentioned earlier is to collect and observe deep information regarding the ERP systems' impact on academics' performance from a purposive group selected carefully by the researcher. According to Blumberg et al. (2011), the analysis of the collected data from the interviews depends mainly on the quantitative data; therefore, any decision that qualitative data shows such as supporting, rejecting, and explaining or confirming is always referred back to the main data of the current study, which is the questionnaire.

There are several techniques, which have been found in the literature regarding the analysis of the collected qualitative data (Bryman and Bell, 2015). According to Easterby-Smith et al. (2015), the researcher has to select the appropriate technique that can help him/her to achieve the main aim of conducting the qualitative method. The techniques that can be adopted in order to analyse the transcripts of the interviews are as follows: (1) content analysis or grounded analysis; (2) thematic analysis; (3) discourse analysis; (4) conversation and argument analysis; (5) computer software analysis, which allows the researcher to use specialised software to analyse the collected data such as NVivo 11.

According to Bryman and Bell (2015), thematic analysis is considered as one of the most common analyses applied for the qualitative data analysis. It underscores pinpointing, investigating, and recording patterns within the data collections. Themes are patterns crosswise over data collections that are essential to the depiction of a specific phenomenon; moreover, it can be related to the nature of particular research objectives and questions. In addition, this kind of analysis considers the highlighted themes as the categories for the examination. Therefore, thematic analysis is performed through coding in six stages to make meaningful patterns. These phases are familiarisation with data, generating initial codes, searching for themes among codes, reviewing themes, defining and naming themes, and producing the final report (Easterby-Smith et al., 2013).

Based on the above-recommended techniques by Bryman and Bell (2015) and Easterby-Smith et al. (2015), the current research has adopted thematic analysis because such a technique has the ability to broaden the analysis, in addition to the flexibility, transparency and its ability to extract the knowledge that can support the final findings of the study (Bryman and Bell, 2015). However, there are some restrictions regarding the thematic analysis such as coding the themes is difficult as well as the problem of asking for clarifications for some questions that are related to the type of “why” (Ibid).

In respect of the qualitative analysis, the researcher has considered five main issues during the analysis period in order to maximise the accuracy and the efficiency of the qualitative analysis. Those five issues are the available information from the participants, the transcription of the collected data, the translation of the collected transcriptions, the handwriting and the notes taking during the interviews. The researcher has categorised the collected answers for each question in a set of groups in order to predict the findings and highlight the key common themes that arise for each question. Additionally, in order to keep the analysis on the right track, the researcher has adopted the five steps approach, which have been provided by Taylor-Powell and Renner (2003). The following table (4.30) explains the five step approach in qualitative analysis:

Table 4.30: The Five-Steps Approach in Qualitative Analysis

Five-Steps	Description
Read	Get to know your data: the researcher should be familiar with the topic by reading and re-reading about it and updating his/her knowledge constantly.
Focus	Focus and review the main goal of the analysis to achieve the target of the study.
Arrange	Classify the collected data to a set of categories.
Identify	Highlight and connect the related categories or patterns.
Interpret	Understand the information clearly in order to extract a logical conclusion that supports the undertaken study/research.

Source: (Taylor-Powell and Renner, 2003).

4.12 Summary

This chapter has discussed in detail the methodology and the methods that have been applied in the present study; moreover, justifications and explanations have been provided for each selection. To conclude, a research methodology is the road map for the researcher on how to conduct research in order to achieve the aims, objectives and answer the questions of the study. Moreover, the methodology and methods play an important role and are considered as the spine of any research or study. This is because by selecting the most appropriate philosophy, techniques and approaches will assist and support the researcher to achieve the targeted objectives and aim. As a starting point, the researcher has explained the different philosophies and their assumptions followed by the research approaches, strategies and finally method selection and linked all the above headings to the current study. The researcher has then discussed the analysis procedures regarding both the quantitative and the qualitative methods by addressing the population, sample selection, questionnaire and interview design, techniques used, questionnaire distribution, ethical approval, questionnaire and interview translation, pilot study and finally different statistical tests for the main collected data. In the business and management field, the positivism philosophy is the most commonly adopted approach by scholars and researchers, which is considered as the most suitable and rational direction for this kind of study (Collis and Hussey, 2013). Thus, the positivist philosophy has been chosen for the present study as the main philosophy fit to answer the research questions. Moreover, positivist falls with the functionalist dimension, acknowledged as can be earlier seen in Figure (4.1), which helps the aim of the current study by investigating the factors in ERP systems that have impact on the academics' performance.

The current study has found the quantitative method is the most appropriate method to be adopted because it corresponds to the ontology and the epistemology of the researcher's beliefs. In addition, mixed methods was adopted only as a data collection technique. Moreover, mixed methods create a balance between the quantitative data and the qualitative data and produces data triangulation, which will benefit the current study by avoiding the limitation of each individual method; thus the data will be completed (McLafferty et al., 2010; Collis and Hussey, 2013; Saunders et al., 2016). The following table (4.31) summarises the methodology and methods underpinnings the current study:

Table 4.31: A Summary of Delineates Methods of Data Collection set Against Methodological Underpinnings

Methodology Underpinnings the Current Study		
Research Philosophy	Positivism – Objectivism	(Chen and Hirschheim, 2004; Pare, 2004; Creswell and Poth, 2017)
Research Approach	Deductive	(Saunders et al. (2016); Easterby-Smith et al., 2015)
Type of Research (Purpose)	Exploratory followed by an Explanatory Phase	(Blumberg et al., 2011; Creswell and Poth, 2017)
Methods Underpinnings the Current Study		
Data Collection Methods	Mixed-Methods (quantitative method as the main method followed by a qualitative method)	(Robinson, 2002; Amaratunga and Baldry, 2002; Johnson and Christensen, 2013)

Type of Mixed Methods Data Collection	Comprehensive Triangulation	(Sarantakos, 2012; Yin, 2013; Flick, 2014; Bryman and Bell, 2015)
Type of Triangulation	Methodological Triangulation, Theory Triangulation, and Validity Triangulation	(Sarantakos, 2012; Flick, 2014; Bryman and Bell, 2015)
Data Collection Tools	Quantitative (Questionnaires); Qualitative (Semi-Structured Interviews)	(Amaratunga and Baldry, 2002; Denzin and Lincoln, 2005; Creswell, 2013)
Type of Questionnaires	Self-Administrated either by email or official post mail	(Denzin and Lincoln, 2005; Blumberg et al., 2011)
Questionnaire Translation Technique	Back-Translation	(Usunier, 1998b; Saunders et al., 2016)
Questionnaire Sampling Technique	Stratified Random Sampling	(Hair et al., 2010; Sekaran and Bougie, 2016; Saunders et al., 2016)
Reliability of the Questionnaire	Cronbach Alpha Test	(Cohen et al., 2011; Walliman, 2011; Sekaran and Bougie, 2016)
Questionnaire Data Analysis Applied Tests	Parametric Tests: (Exploratory Factor analysis, Confirmatory Factor Analysis, and Structural Equation Modelling)	(Field, 2013; Gravetter and Wallnau, 2016)
Questionnaire Data Analysis Tools	SPSS 23 and AMOS 23 Advanced Statistical Software	(Field, 2013; Gravetter and Wallnau, 2016)
Type of Interviews	Face-to-Face and International Telephone Call Interviews	(Blumberg et al., 2011; Bernard, 2013; Sekaran and Bougie, 2016)
Interview Sampling Technique	purposive sample	(Ghauri and Gronhaug, 2005; Bernard, 2013; Easterby-Smith et al., 2015)
Interviews Data analysis	Thematic Analysis (Supported by Nvivo 11 Software Tool)	(Easterby-Smith et al., 2013; Bryman and Bell, 2015)

CHAPTER FIVE: QUANTITATIVE DATA ANALYSIS

5.1 Introduction

This chapter presents the results obtained through the questionnaire. It divides the collected data into two parts: demographic data (nominal) and numeric data (scales). The questionnaire statements and questions focus on the attitudes of the academic staff in Saudi universities regarding the impact of the ERP systems on their performance. Moreover, this chapter presents all of the processes that have been followed by the researcher in order to enhance and organise the gathered data. The last part of this chapter presents the descriptive analysis and the statistical analysis using two related statistical packages (SPSS 23 and AMOS 23). The demographic and the statistical analysis have been applied to achieve the main objectives of this thesis by highlighting the factors that affect the academic staff's performance while they are using implemented ERP systems in their universities.

As a starting point, it is vital to prepare and check the collected data in order to confirm that it can proceed to the next process, which is the analysis step. According to Tabachnick and Fidell (2007), one of the challenges and the most common problem that can be faced in the data analysis is missing data and values. Similarity, Pallant (2016) stated that it is very infrequent to find clear data without any missing values, especially for these kind of data related to human attitudes and participation. Moreover, Pallant (2016) points out that the missing data may occur randomly or even in a systematic pattern. Therefore, to avoid any error in inputting the data, data screening for the collected data was undertaken in order to ensure that the collected data are accurate by applying several checks. These checks include deleting the missing data or values, checking outliers that could affect the results and finally ensuring that the data are normally distributed.

5.2 Initial Data Consideration

5.2.1 Response Rate

The questionnaires were distributed to the current study sample in November 2015 and most of the filled questionnaires were collected in February 2016. The researcher distributed the questionnaire in different Saudi universities. Some of the questionnaires were sent by the main postal centre and other questionnaires sent to other academic staff from the official e-mail for the researcher in order to increase the number of participants. The total number of questionnaires distributed to academics across the different Saudi universities was 650. The returned questionnaires that have been received and collected via the main postal centre was 321. However, fourteen questionnaires were incomplete; thus, the fourteen incomplete questionnaires were excluded from this study. Moreover, the total number of the received questionnaires from the academics via the official e-mail address of the researcher was 150 and all of them were completed. The following table (5.1) shows the distributed and the collected number of questionnaires from the study's sample.

Table 5.1: Distributed Questionnaires and Response Rate

	Sample Size detected by Yamane's formula	Distributed Qs	Returned Qs by post	Returned Qs by e-mail	Returned Qs excluded	Accepted Returned Qs	Missing Qs
Saudi Universities	397	650	321	150	14	457	179
Respond Rate			49.4%	23.1%	2.2%	70.3%	27.5

Source: Created by the researcher. **[Qs = Questionnaires]**

To be more specific, the following table (5.2) demonstrates the returned and accepted questionnaires for each group.

Table 5.2: Distributed and Accepted Returned Questionnaires for Each Group

	Groups Population	Groups Rate %	Sample Size for Group	Distributed Qs	Accepted Returned Qs
Professor	3521	6.4	25	42	28
Associate Professor	6807	12.5	50	81	63
Assistant Professor	16434	30.1	120	196	138
Lecturer	8338	15.2	60	99	72
Teaching Assistant	19573	35.8	142	232	156
Total	54673	100	397	650	457

Source: Created by the researcher.

5.2.2 Data Screening

The second section of the analysis chapter has examined the instrument items in this research by using the statistical software package SPSS in order to check four main issues that would increase the value of the research data. These four checks are for the missing data, the outliers, normality check and finally the reliability check through the Cronbach's Alpha test.

5.2.2.1 Missing Data

As mentioned in the last section, missing data is considered as one of the problematic issues in data analysis. This section demonstrates several related issues regarding the missing data. First of all, missing data may create obstacles for researchers in the analysis processes, and some of these may reduce capabilities to indicate effective correlations that should be highlighted between two or more factors and items inside the collected data by the different statistical assessments (Hair et al., 2004). Moreover, another problem is that it can produce biased parameter estimates (Ibid). The importance of missing data could rest with several issues such as the missing observation pattern, occurrence frequency and the reason behind the missing data. These issues can declare whether the missing data are significant or not (Tabachnick and Fidell, 2001). Additionally, they state that there are two viewpoints regarding missing data. The first point of view is that if there is a systematic pattern for the missing data, which means the missing data cannot be ignored and are not missing randomly, then any attempt to fix the problem could produce biased finding. On the other hand, the other point of view is that if the missing data were scattered randomly, in this case any attempt to remedy the missing data would lead to the production of satisfactory findings.

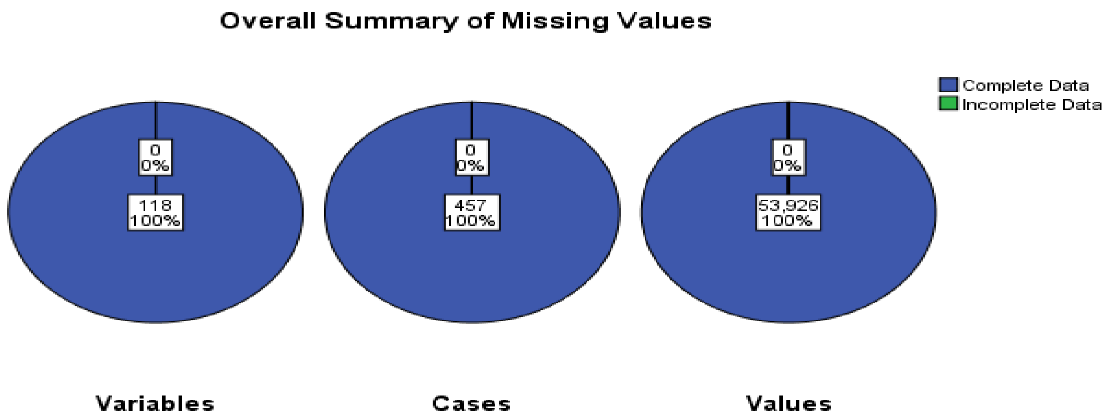
Secondly, regarding the issue of the acceptable range of the missing data, there is no direct standard/rule made by scholars and researchers in the literature. However, some researchers have made suggestions about the acceptable range, such as Cohen et al. (2013) who stated that 5 to 10 percent of missing data related to a specific item/variable, is not considered as a problematic issue. Similarly, Hair et al. (2010) and Kline (2011) have declared that if the missing data were reasonably minor compared to a large dataset, in this case, the small amount of the missing data would not become as a serious problem for the final findings of the data analysis and it could lead to satisfactory results and findings.

Thirdly, in order to remedy and fix the missing data in a dataset, there are several approaches, which have been highlighted in the literature. These approaches are listwise deletion, pairwise deletion and imputation. The first approach, listwise deletion, can only be determined on a completed dataset. According to Arbuckle (2003), the listwise deletion could decrease the size of the overall sample, which would lead to a reduction in the statistical power for the large sample. The second approach, the pairwise deletion, applies a different mechanism to deal with the missing data by deleting the cases that are missing on a specific involved variable in the statistical examination. In the case of the pairwise deletion, it could cause a problematic issue regarding the different analysis tests. This is because the pairwise deletion leads to inconsistency and different sample sizes for each analysis, which would lead to an error in the covariance matrix and the error will be explained by any analysis programs as follows (the covariance matrix cannot be defined) (Arbuckle, 2003). The final approach is the imputation method, which involves the researcher using one of the two main tools (mean imputation and regression-based substitution) in order to estimate the missing data, based on other valid data values by other participants in the dataset. According to Hair et al. (2010), the two main tools that could be applied in the imputation method are the mean imputation and the regression-based substitution. The mean imputation tool calculates the mean from the overall sample and replaces the missing data with other values, which could shrink the relationship among the set of variables. Another disadvantage is that the variances and covariances for the missing values can be underestimated and underrated (Byrne, 2013). Therefore, Arbuckle (2003) declared that the mean imputation is inappropriate for datasets that are used in Structural Equation Modelling (SEM). This is because the mean imputation could affect and damage the variances and the covariances of the dataset. On the other hand, according to King and He (2005), regression-based substitution, always considers the participant’s set of answers and produces accurate values.

There is another debate in the literature regarding the missing data in a particular situation: if the missing data were lower than five percent of the overall data it is acceptable to remedy the missing values to the mean value (Hair et al., 2010; Schumacker and Lomax, 2012).

In the current study, the researcher has excluded around 5% of the returned questionnaires because most of the questions were left unanswered (see above table 5.1). After the incomplete questionnaires were excluded from the beginning, no missing data was detected in the current study’s dataset. The following figure (5.1) demonstrates the frequency and the percentage of the missing data through the multiple imputation test on SPSS.

Figure 5.1: Overall Summary of Missing Data



Source: Created by the researcher.

5.2.2.2 Outliers

Outliers can be defined as the cases or participants who have answered the questions very differently from other participants in the collected data (Kline, 2011). According to Tabachnick and Fidell (2007), there are two kinds of outliers that have to be tested by researchers, univariate outliers and multivariate outliers. The univariate outliers can be defined as a data point that consists of an extreme value on one variable, whereas the multivariate outlier is considered as an abnormal combination of values between two variables or more (Kline, 2011). In the case of the univariate outliers, it could seriously affect and misrepresent quantitative analysis such as standard errors for a particular test and the estimates model fit. Despite this, in the literature there are no specific criteria to highlight a particular case that exceeds the point to become a univariate outlier. However, Kline (2011) stated that if a value in the dataset has exceeded more than three standard deviation extremes from the mean, it is considered as a univariate outlier. In the present study, the researcher has examined the univariate outliers by saving the standardised values as variables in the descriptive analysis and comparing the results with the absolute Z score value (3.29). According to Tabachnick and Fidell (2007), by using the standardised values in the descriptive analysis, any value that exceeds +3.29 or -3.29 can be called a univariate outlier. In the current dataset, there were no values, which exceeded this value; therefore, no univariate outliers were reported. The following table (5.3) shows the results for the univariate outliers test.

Table 5.3: The Results for the Univariate Outliers Test					
Items Z Score	**Min**	**Max**	**Items Z Score**	**Min**	**Max**
Improve Academics' Performance1	-1.9282	1.6617	Right Data 2	-1.75014	1.66422
Improve Academics' Performance2	-1.8564	1.7198	Right Data 3	-2.41949	1.36718
Time Taken to Complete Task1	-2.0398	1.6337	Lack of Confusion 1	-1.52920	2.12489
Time Taken to Complete Task2	-2.0391	1.7879	Lack of Confusion 2	-1.63738	1.72947
Academics' Confidence & Performance	-2.1635	1.7522	Timeliness 1	-1.39029	2.55606
System Awareness	-2.0480	1.6845	Timeliness 2	-1.17062	2.59680
Immediate Recall of Information	-1.9281	1.5930	Timeliness 3	-1.30436	2.46241
Ability to Identify Problem and Solutions1	-2.1019	1.7442	Timeliness 4	-1.26305	2.33329
Ability to Identify Problem and Solutions2	-2.0853	1.6592	Content 1	-1.47132	2.29911
Ability to Identify Problem and Solutions3	-2.1161	1.6733	Content 2	-1.55660	3.12345
Ease of Use 1	-.97242	2.40060	Content 3	-1.51947	2.62000
Ease of Use 2	-.96137	2.66959	Content 4	-1.61685	2.86813
Ease of Use 3	-1.01459	2.70219	Format 1	-1.41634	2.47699
Ease of Use 4	-.98180	2.95400	Format 2	-1.45226	3.24638
Accessibility 1	-1.17672	2.51501	Format 3	-1.37810	3.03865
Accessibility 2	-1.20956	2.24525	Reliability 1	-1.46884	2.55069
Accessibility 3	-1.32178	2.72323	Reliability 2	-1.40061	2.33708
Assistance 1	-1.43856	2.11507	Reliability 3	-1.45566	3.14480
Assistance 2	-1.55978	2.05859	Reliability 4	-1.49523	3.25004
Authorisation 1	-1.70418	1.77654	Reliability 5	-1.43330	3.15489
Authorisation 2	-1.77553	1.52963	Responsiveness 1	-1.22291	1.86903
Flexibility 1	-1.31611	2.04401	Responsiveness 2	-1.18586	1.67021
Flexibility 2	-1.49433	2.20206	Responsiveness 3	-1.17921	1.83983
Training 1	-2.37732	1.29617	Responsiveness 4	-1.25289	1.79271
Training 2	-2.28855	1.40057	Assurance 1	-1.29087	2.98396
Training 3	-1.81995	1.10606	Assurance 2	-1.29113	3.07959
Accuracy 1	-1.48211	3.08669	Assurance 3	-1.43354	2.73926
Accuracy 2	-1.35613	2.85270	Empathy 1	-.97204	2.13441
Compatibility 1	-1.18868	3.13502	Empathy 2	-.85687	2.46167
Compatibility 2	-1.37977	3.02201	Empathy 3	-1.22374	2.49839
Compatibility 3	-1.35180	2.97586	Empathy 4	-1.12983	2.88832
Compatibility 4	-1.38885	3.13135	Tangible 1	-1.39095	2.52685
Currency 1	-1.76580	2.42082	Tangible 2	-1.40724	2.06903
Currency 2	-2.25053	1.75139	Tangible 3	-1.33854	2.05515
Currency 3	-1.86541	2.08589	Tangible 4	-1.5109	2.8181
Right Data 1	-2.48851	1.48441			

On the other hand, the multivariate outliers can be tested with a statistical analysis, Mahalanobis Distance (D^2), which is considered as a measure to assess each value compared with the centre of the other values that appear in a group of variables (Byrne, 2013; Hair et al., 2010). According to Tabachnick and Fidell (2001), a very conservative statistical examination of significance such as the level 0.001 is suggested to be used with D^2 measures; this is because the Mahalanobis test classifies the case as an extreme value on one variable or more. In this study, the researcher has applied the D^2 test through SPSS in order to exclude any multivariate outliers in the dataset to ensure that multivariate outliers will not affect any further statistical analysis. The result of the D^2 test was that the total of the multivariate outliers was lower than five percent of the total collected data. According to Kline (2011), if only a few outliers have appeared in a large sample size, they will not be considered as a major problem for the dataset results and findings. Moreover, there is no adequate resistance, which could suggest to the researcher that these outliers are not related to the targeted population. As those outliers could sincerely have given honest answers; however, it could be different from the majority of participants regarding the factors that impact their performance and productivity while using ERP systems.

In the current study, D^2 test was applied in order to highlight if there is any multivariate outlier in the dataset. D^2 test was run in SPSS to create a new column that can be compared to the critical value (χ^2) with degrees of freedom equal to the total number of the independent variables. If any value is lower than the probability value of 0.001 then it can be considered as a multivariate outlier. The result of the D^2 test has shown that 11 multivariate outliers appeared in the dataset, which is less than 5 percent of the overall data. Additionally, the 11 multivariate outliers have been used in another test to indicate their impact on the other independent variables by comparing the R-squared (R^2) value, which explains how the data vary from the fitted regression line. The following table (5.4) shows the results of the R^2 value without deleting any outliers and deleting all the outliers.

Table 5.4: The Result of the R^2 Value After Deleting the Outliers

Case No.	Without Deleting	Delete case 12	Delete case 26	Delete case 48	Delete case 86	Delete case 92	Delete case 124	Delete case 153	Delete case 208	Delete case 246	Delete case 283	Delete case 334	Delete All cases
R2	0.713	0.710	0.711	0.710	0.712	0.713	0713	0.708	0.716	0.711	0.708	0.714	0.699
Samples	457	456	456	456	456	456	456	456	456	456	456	456	446

Source: Created by the Researcher.

Based on the above table, the R^2 without deleting any outliers is (0.713) and after deleting all the outliers, the R^2 is (0.699), which means that there is only a small effect on the total of the variable explanation to the variance. Another check has been done in order to support the final decision regarding the outliers issue by comparing the D^2 with the critical value (χ^2) for the current dataset, which is 100.888. In any case, which has a higher value than the test χ^2 value; it can be considered as an outlier. The result of this test confirm that the dataset has 11 outliers, whereas the D^2 for the outliers are not that far from the test (χ^2). The following table (5.5) shows the results for the 11 outliers and the D^2 for each one of them.

Table 5.5: The Results for the Revealed Outliers

Cases	D2	Calculated Probability	Probability	χ^2
Case 12	130.432	0.00000	0.001	100.888
Case 26	128.687	0.00000	0.001	100.888
Case 48	126.175	0.00000	0.001	100.888
Case 86	123.651	0.00000	0.001	100.888
Case 92	123.649	0.00000	0.001	100.888
Case 124	121.067	0.00001	0.001	100.888
Case 153	114.334	0.00004	0.001	100.888
Case 208	113.302	0.00005	0.001	100.888
Case 246	106.222	0.00030	0.001	100.888
Case 283	105.563	0.00035	0.001	100.888
Case 334	103.271	0.00059	0.001	100.888

Source: Created by the researcher.

Based on the above examinations, a decision was made to keep the outliers in the dataset based on two justifications; the first reason is in reference to the statement of Kline (2011), a few outliers in a large dataset should be considered as a minor concern. The second reason is in reference to the suggestion of Hair et al. (2010). Whereas the multivariate analysis will increase by deleting the outliers, however, that would risk and limit the generalisation of the final findings. Additionally, the researcher has supported the decision by three comparative tests: R^2 value, critical value and calculated probability.

5.2.2.3 Normality

One of the most important tests before starting the statistical analysis is the normality check for the data distribution. Normality can be defined as the *"shape of the data distribution or an individual metric variable and its correspondence to the normal distribution, which is the benchmark for statistical methods"* (Hair et al., 2010, p. 70). By applying the residuals scatter plot, a set of examinations can indicate the normality, linearity, multicollinearity and homoscedasticity among the estimates errors and the dependent variable values.

Firstly, many tests could be applied to indicate the normality of any dataset; these tests are the range of skewness and kurtosis, the normal probability plot and histogram, the skew and Kurtosis test, and finally the Shapiro-Wilk test. The skewness and kurtosis test can be defined as the value, which describes the similarity of distribution, whereas the kurtosis can be described as the uniformity/monotony of the distribution compared with the ordinary distribution. According to Pallant (2016), if the values of the skewness range between (-2) to (+2) then there will be a positive skewed distribution and that will appear as only a few large values tending to the left. On the other hand, if the skewness is outside the range of (-2) to (+2) then there will be a negative skewed distribution and that will appear and only a few small values tending to the left (George and Mallery, 2016). In the present study, the researcher has applied descriptive analysis to indicate the skewness and kurtosis for the variables in the dataset. The results of the test were that there is no skewness and kurtosis values more or less than the acceptable value of (-2) or (+2). Therefore, there was no need to remedy and fix any of the variables in the dataset by applying data transformation or by the Bootstrapping technique (Arbuckle, 2003; Hair et al., 2010). The following table (5.6) outlines the skewness and kurtosis values for the independent variables and its items.

Table 5.6: Normality Assessment

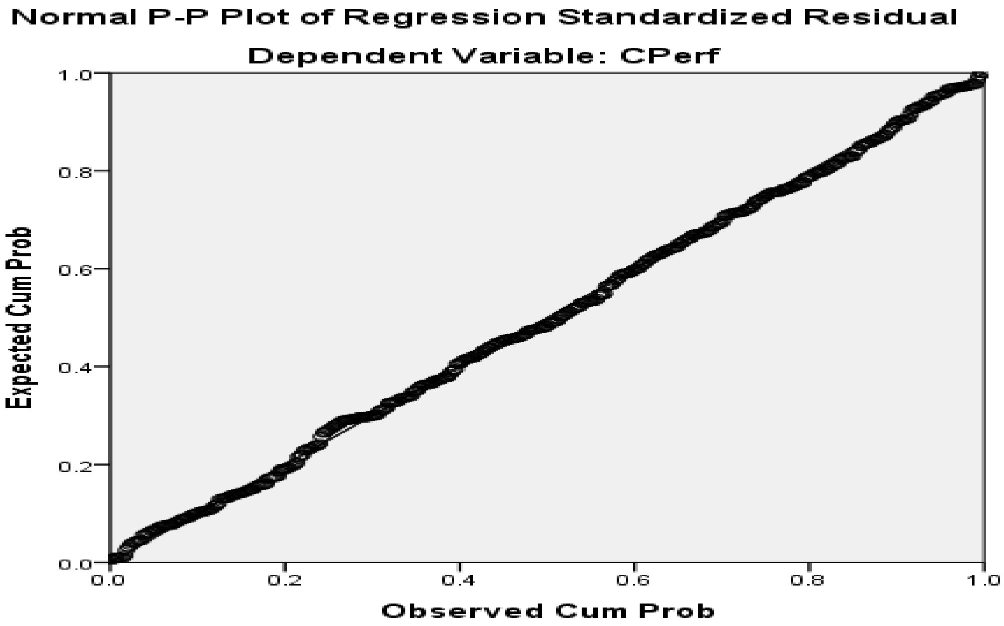
	Items	Skewness	Kurtosis		Items	Skewness	Kurtosis
Ease of Use	EOU1	1.096	.384	Compatibility	Comp1	.793	.494
	EOU2	1.128	.706		Comp2	.710	.464
	EOU3	.919	.283		Comp3	.824	.488
	EOU4	.986	.219		Comp4	.792	.698
Timeliness	Time1	.864	.199	Content	Cont1	.498	.004
	Time2	.861	.189		Cont2	.516	-.114
	Time3	.772	-.008		Cont3	.559	-.341
	Time4	.803	-.157		Cont4	.502	-.281
Accessibility	Acce1	.770	.381	Currency	Curr1	.343	-.881
	Acce2	.790	.144		Curr2	-.238	-.883
	Acce3	.874	1.204		Curr3	.302	-.994
Training	Trai1	-.428	-.948	Right Data	RD1	-.792	-.125
	Trai2	-.258	-1.220		RD2	.140	-1.169
	Trai3	-.557	-.947		RD3	-.753	-.116
Assistance	Assi1	.410	-.667	Authorisation	Auth1	-.067	-1.031
	Assi2	.288	-.803		Auth2	-.176	-.992

Flexibility	Flex1	.542	-.723	Lack of Confusion	LOC1	.311	-.824
	Flex2	.390	-.711		LOC2	.145	-1.095
Format	Form1	.731	-.102	Assurance	Assu1	.978	.876
	Form2	.813	.655		Assu2	.736	.220
	Form3	1.155	1.984		Assu3	.662	-.078
Tangible	Tang1	.813	.051	Responsiveness	Resp1	.380	-1.121
	Tang2	.634	-.678		Resp2	.312	-1.308
	Tang3	.535	-.659		Resp3	.467	-1.065
	Tang4	.793	.143		Resp4	.477	-.938
Reliability	Reli1	.757	-.280	Empathy	Empa1	.989	-.130
	Reli2	.671	-.265		Empa2	1.205	.497
	Reli3	1.051	1.603		Empa3	.880	.200
	Reli4	1.000	1.302		Empa4	.819	.061
	Reli5	.974	1.501				
Academics' Performance	IAP1	.105	-.934				
	IAP2	.132	-.975				
	TTCT1	.207	-1.073				
	TTCT2	.140	-.748				
	ACP	.066	-.803				
	SA	.035	-.719				
	IMRI	.072	-.992				
	AIPS1	.045	-.776				
	AIPS2	.089	-.910				
	AIPS3	.027	-.779				

Source: Created by the researcher.

Additionally, the researcher has tested the normal probability plot in order to examine the multivariate normality. The result of the regression standardised residual for the normal probability plot was ordinary. As it can be seen clearly in the figure (5.2) below, the data are closely following the line and there are no curves, which can be caused by the non-normality, which means the dataset is well distributed (Hair et al., 2010).

Figure 5.2: Normal P-P Plot of Regression Standardised Residual



The third set of normality tests are Skew and Kurtosis test and the Shapiro–Wilk test. According to Field (2013), if the dataset has a large sample size, using both examinations to determine the normality by depending on the significant value will present ineffective and inaccurate results regarding the normality issue. This is because the significant value in both tests will be affected by the large sample size and the reading for both tests can be significant even if the data is normally distributed (Ibid). Moreover, if the sample size is larger than 30, "*the sampling distribution has a normal distribution with a mean equal to the population mean"* (Ibid, p. 42). Therefore, the researcher did not apply the two above examinations because this study has a large sample size, so the reading for the significant values in both tests will be ineffective to determine the normality of the data.

Another two tests applied to check the normality of the dataset are the linearity test and the homoscedasticity. Linearity can be spotted when residuals and the dependent variable values have a relationship that can be presented and shown as a straight line. On the other hand, if the shape of the scatter plot is presented in a curved line then the dataset has a nonlinearity issue.

In contrast, homoscedasticity can be defined as when the standard deviations of the independent variable errors are roughly equivalent for all dependent variable values. The group enclosing the residual is roughly identical in range to all of the dependent variables. Therefore, when the group of the dependent variables values are getting wider, the dataset can be present heteroscedasticity (Tabachnick and Fidell, 2007).

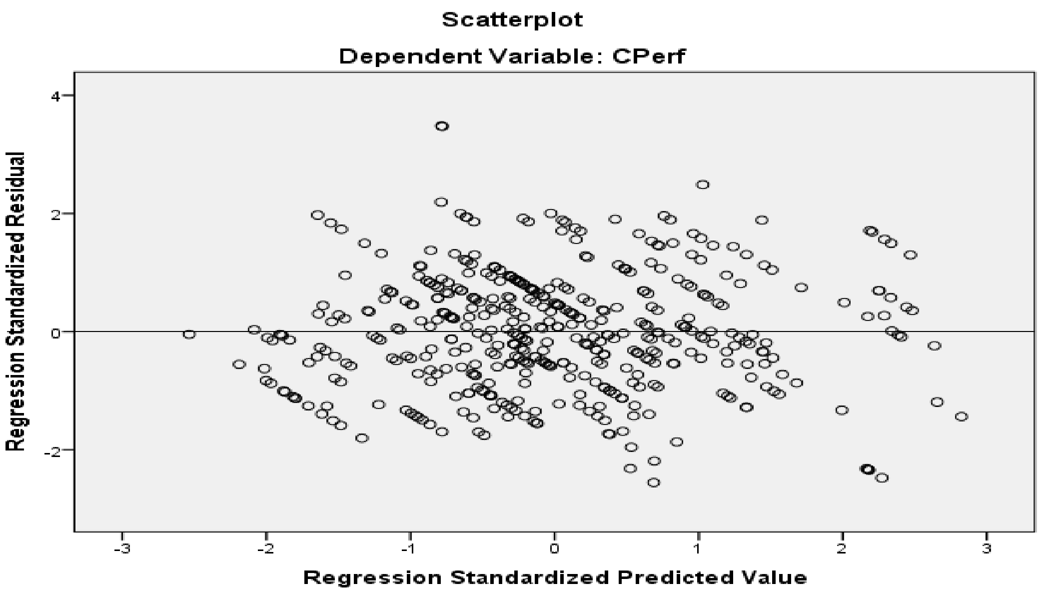
In addition, a dataset needs to show homoscedasticity, which is where the variances along the line of best fit remain similar as you move along the line.

Additionally, there is another test can be deployed in order to check the linearity of the dataset, which depends on the relationship between an independent variable and dependent variables (Field, 2013). The results for this test have indicated that a Sig. value for the linearity is 0.184 and for the deviation from linearity is 0.118. As it can be seen, the Sig. values are larger than the p-value (0.05), which means that the dataset for the current study is linear (Ibid). The following table (5.7) shows the results of the ANOVA test to check the linearity of the dataset.

Table 5.7: ANOVA Test to Check the Linearity			
Dependent Variable	**Test Name**	**Sig.**	**P-Value**
	Linearity	**.184**	**0.05**
	Deviation from Linearity	**.118**	**0.05**

In the current study, the above linearity test has shown that the linearity of the current data has been achieved and the homoscedasticity was detected. The following figure (5.3) demonstrates the homoscedasticity of the data via the scatter plot chart, which has been presented in non-widening shape.

Figure 5.3: The Scatter Plot for the Dependent Variable



Source: Created by the Researcher.

Another important test is the multicollinearity examination, which is associated with the correlation matrix. Multicollinearity can be shown if there is extreme correlation between the variables in a dataset. The definition of extremely correlated variables is that the degree of the correlation should be between 0.9 to 1 (Field, 2013). In this study, the researcher has applied the bivariate method to indicate the correlation of the dataset variables. The results of the previous test have shown that there are no correlations among the dataset variables above 0.78. Appendix (3) presents the full results of the bivariate method correlation test.

The second test that has been applied in this study regarding the multicollinearity is the multivariate correlation, which can be measured by applying the residual analysis and the coefficients output. According to Vuuren et al. (2007), if the tolerance reading is < 0.2 and VIF is < one and >10, multicollinearity of a particular independent becomes problematic, which could cause a serious issue for further advanced analysis such as multiple-regression. Therefore, scholars and researchers have mentioned some strategies that can be followed in order to fix this issue. Belsley et al. (2005) have recommended that to remedy the multicollinearity issue, a researcher can centre one or more variables in the dataset. Another suggestion has been reported by Tabachnick and Fidell (2007), that a researcher can apply the principal component method in the factor analysis test and choose the components as predictors as an alternative to the original variables. Additionally, the confirmatory factor analysis is estimating direct relationship for the errors of the measurement. Therefore, the output results from confirmatory factor analysis regarding the correlations between the constructs/factors, which can be considered as more accurate and precise (Hair et al., 2010; Kline, 2011). This is because the confirmatory factor analysis does not require collapsing the different items in one construct together; also, the structural equation model calculates the construct scores for each participant (Hair et al., 2010). Moreover, the estimation, which is applied in the structural equation model, assumes that the dependent variable is distributed normally for the continuous variables (Kline, 2011).

In the current study the results of the multivariate correlation were that all the tolerance readings for the variables were higher than (0.2) and the variance inflation factors (VIF) were between (1 to 10). Both readings for the tolerance and the VIF show that there is no multicollinearity in the current dataset. The following table (5.8) illustrates the tolerance and the VIF of the current dataset.

Table 5.8: Assessment of Collinearity (Dependent variable: CPerformance)			
Constructs	Sample Size (N)	Collinearity Statistics	
		Tolerance	VIF
CEOU	457	.948	1.055
CAccess	457	.524	1.908
CAssis	457	.445	2.245
CAuth	457	.903	1.108
CFelx	457	.867	1.154
CTran	457	.885	1.130
CAccu	457	.711	1.407
CComp	457	.435	2.298
CCurre	457	.629	1.590
CRD	457	.759	1.318
CLOC	457	.787	1.270
CTimel	457	.816	1.226
CCont	457	.594	1.653
CFormat	457	.356	2.811
CReli	457	.366	2.729
CRespon	457	.948	1.055
CAssur	457	.609	1.642
CEmpa	457	.892	1.121
CTan	457	.613	1.632

5.3 Demographic Profile of the Study Sample and Descriptive Analysis of Respondents' Responses

5.3.1 Demographic Profiling Confirms the Representatives of the Dataset

This section will review the demographic profiling questions in order to confirm the representativeness of the sample regarding the impact of ERP systems on academics' performance in Saudi universities. As it has been explained in the methodology chapter, the stratified random sampling technique has been chosen in order to increase the validity of the sample to suit the whole population of the study. Therefore, descriptive statistics have been applied for the demographic questions, which are in the first section of the questionnaire (appendix 2). There are two main reasons to mention for the inclusion of descriptive statistics: firstly, to generate a profile data of the respondents in order to obtain a comprehensive overview of their specific characteristics, and secondly, to enable the researcher to assess the need for any re-categorisation of the demographic data section in the questionnaire. As mentioned earlier, a sample of 457 participants was involved in the current research. The following table (5.9) shows the demographic profiling for the first section in the questionnaire.

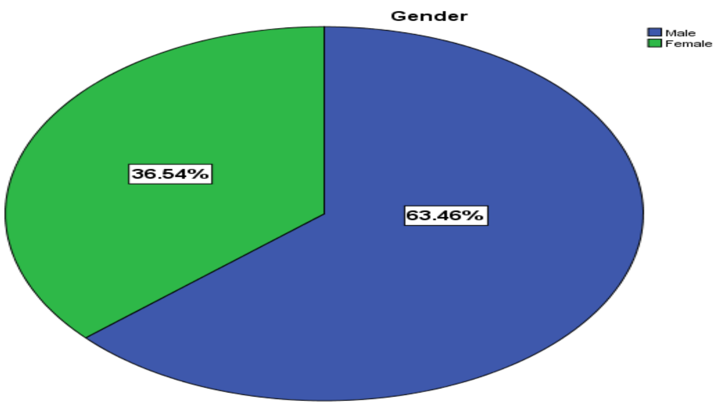
(Profile Questions Section One)	Demographic Profiling Questions						No.
Gender	Male (63.5%)	Female (36.5%)					457
Academic Qualification	PhD (47.3%)	MS (33.4%)	BA (19.3%)				457
Job Title	Professor (6.1%)	Associate Professor (7.9%)	Assistant Professor (27.4%)	Lecturer (31.5%)	Teaching Assistant (27.1%)		457
Area of Expertise	Business (14.4%)	Science (17.3%)	Medicine (9.6%)	Enginee (16.8%)	Education (30.6%)	Others (11.2%)	457
Years of Employment at University	Less than 5 years (36.8%)	5-10 years (35.7%)	11-15 years (12%)	16-20 years (3.7%)	More than 20 years (11.8%)		457
Years of Experiences using ERPs	Less than 2 years (10.1%)	3-4 years (42.2%)	5-6 years (31.9%)	7-8 Years (7.4%)	9-10 years (6.3%)	More than 10 years (2%)	457
The Using of ERPs	Daily (62.1%)	Weekly (24.7%)	Monthly (9.4%)	Annually (2.2%)	Other: (1.5%)		457
Charge of Administrative Duties	Yes (30.6%)	No (69.4%)					457

Table 5.9: Descriptive Statistics for the Profile Questions

Source: Created by the researcher.

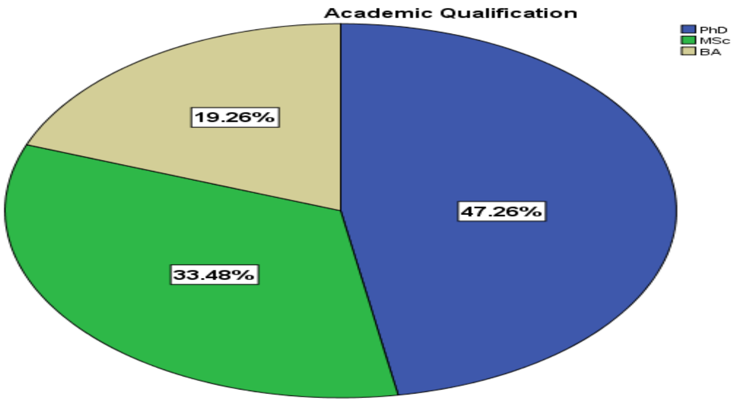
The first demographic question was about the gender of the academics, which divided the participants into two groups, male and female. The results of the first question show that (63.5%) of the overall sample were male and (36.5%) were female. This reflects the actual representativeness of the academic staff population in Saudi universities, which is (69.6%) male and (30.4%) female (Ministry of Education Saudi Arabia, 2016). The following figures (5.4) demonstrates the percentage of the gender.

Figure 5.4: Respondents' Gender



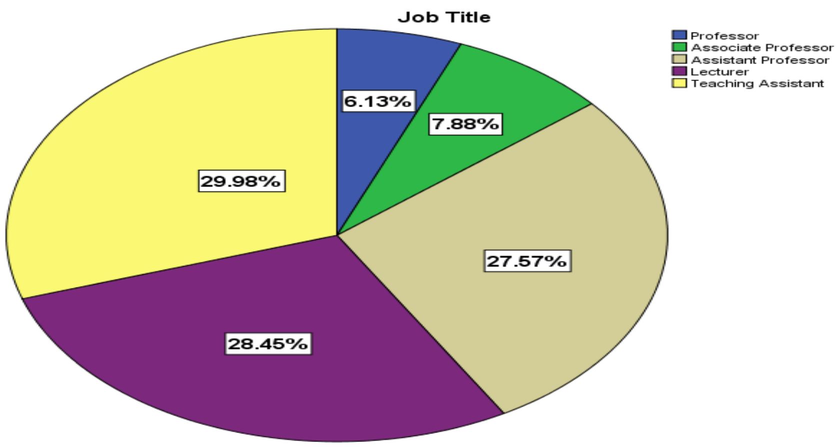
The analysis of the academic qualification profiling of the main study sample shows that academics with PhD qualification comprise (47.3%) while the remaining (52.7%) are divided between Masters (33.4%) and Bachelors (19.3%). The researcher found that the above results reflect the overall academic qualifications of teaching staff in Saudi universities, which is (48.93%) for academics as PhD holders, (15.25%) for academics as Masters holders and (35.82%) for academics as Bachelor holders (Ibid). The following figures (5.5) illstrates the percentage of the academic qualification.

Figure 5.5: Respondents' Academic Qualification



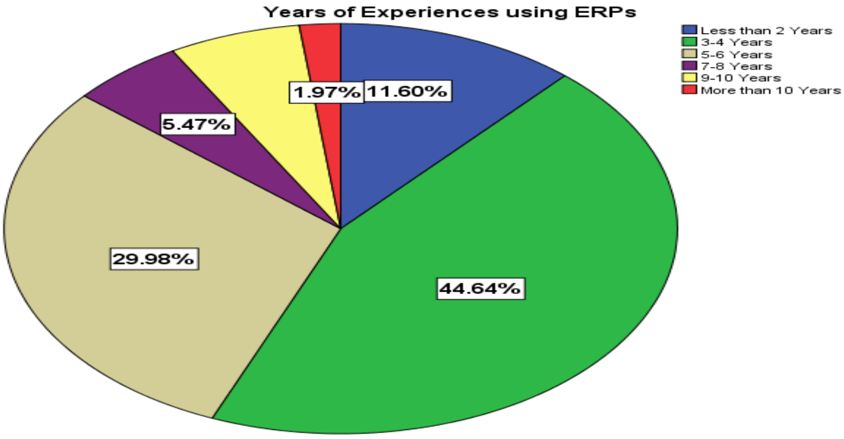
As shown above in table (5.6), the majority of participants are teaching assistants (30%) and the second highest group is split between assistant professors with (27.4%) and lecturers with (28.4%). There are only (14%) of participants who are professors and associate professors. This result reflects the reality of academic staff numbers on the ground regarding their job title in Saudi universities: professors (6.44%), associate professors (12.45%), assistant professors (30.06%), lecturers (15.25%), and teaching assistants (35.80%) (Ibid). The following figures (5.6) shows the percentage of the job title.

Figure 5.6: Respondents' Job Title



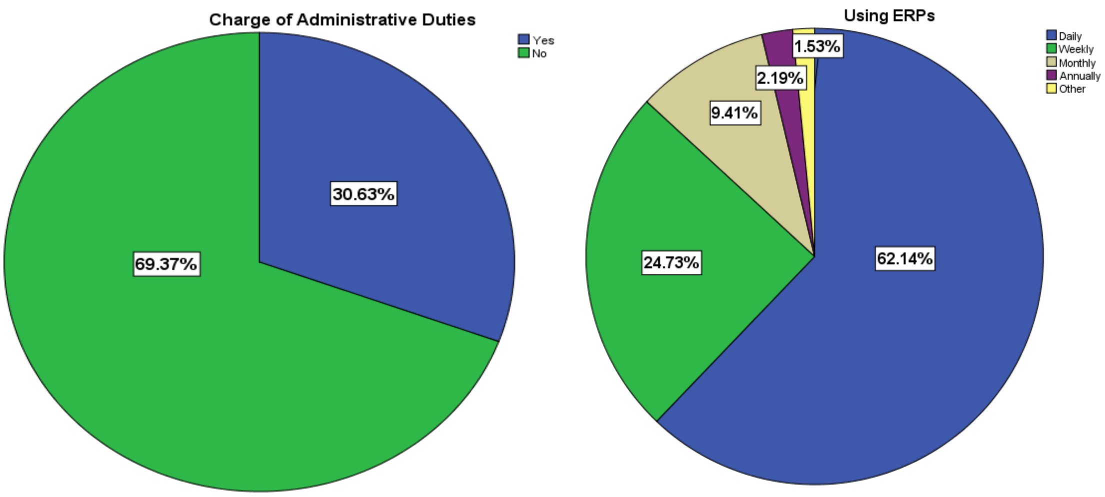
In term of years of experience using ERP systems, the respondents' profiles indicate that the participants who have experience using ERP systems of less than 2 to 4 years were (52.3%) and those with experience of more than 5 to 10 years were (47.7%). The two groups together (less than 2 to 4 years) and (5 to 10 years) constitute about (50%) of the total respondents. The following figures (5.7) shows the percentage of the years of experience using ERP systems.

Figure 5.7: Respondents' ERP Experience



Additionally, the demographic profiling revealed that the respondents represent different responsibility for administrative duties, and the regularity of using ERP systems. This is a good indication for the dataset by including participants from various prespectives. The following figures (5.8) demonstrates the percentage of the charge of administrative duties and the regularity of using ERP systems:

Figure 5.8: Respondents' Charge of Administrative Duties and Use of ERP Systems



5.3.1.1 Summary of the Demographic Profiling Section

The demographic profiling in this study contained seven questions that relate to the ERP systems and the academic staff. The first question divided the overall participants into two groups - male and female. The three following questions asked the level of education and the job title of each academic. The last three questions determined their years of experience using the ERP systems and the level of their experience. The results of the questions reflected the representativeness of the sample as the researcher has compared the finding with official statistics from the overall population regarding the context of this study.

5.3.2 Descriptive Analysis of Respondents' Responses

This section outlines a descriptive analysis of the data collected from the current study sample. Each sub-section reports one of the constructs of the current study in the form of central tendency and dispersion. The questionnaire contains 1 dependent variable, which were measured by 10 items/statements and 19 independent variables, which were measured by 61 items/statements using a five – point Likert scale ranging from (1) "strongly agree" to (5) "strongly disagree". Respondents' answers were coded as follows: number (1) indicated that they strongly agreed with the statement, number (2) agreed, number (3) neutral, number (4) disagreed, and number (5) strongly disagreed with what the statement states. In addition, number (3) in the Likert scale was selected as the midpoint in order to make a distinction between the respondent's agreement and disagreement. Appendix (4) shows the results of the descriptive analysis of the respondents' responses regarding all variables.

5.3.2.1 Academics' Performance

The results reveal that the mean scores of the two items used to measure academics' performance ranged between (2.120 to 2.754) with standard deviation ranging from 1.049 to 1.235, thus indicating that most of the participants have tended more to the agreement regarding the ten items such as the ERP systems have a positive impact on the productivity of my job, the ERP systems reduce the time taken to accomplish my tasks, the ERP systems are an important aid to me in the performance of my job, and the ERPs enhance my awareness about the systems.

5.3.2.2 Ease of use

Participants were asked whether it is easy to learn how to use the ERP systems. The results outline the mean scores of the four items used to measure ease of use and are between (1.0998 to 2.153) with standard deviation ranging from 1.076 to 1.188. It could be concluded that most of participants (mean score is less than the midpoint of 3) were agreed about the ease of use of ERP systems in term of easy to learn and easy to use.

5.3.2.3 Accessibility

The results disclose that the mean scores of the three items used to measure accessibility were between (1.956 to 2.050) with standard deviation ranging from 0.742 to 0.868, thus indicating that most of the participants have no major problem with access to ERP systems because the mean score is less than the midpoint of (3).

5.3.2.4 Assistance

Using a five-point Likert scale and two items, the assistance construct was measured. As shown in appendix (4), the perceived mean score ranged from 2.619 to 2.724 and standard deviations from 0.742 to 0.868. These means scores indicate high agreement among participants regarding the help that is needed in accessing and understanding the data.

5.3.2.5 Authorisation

The results reveal that the mean scores of the two items used to measure authorisation were between (2.958 to 3.148) with standard deviation ranging from 1.149 to 1.125, thus indicating that most of the participants have tended more to agreement regarding the first item (data that would be useful to me are available because I do have the right authorisation). On the other hand, most participants have tended more to disagreement regarding the second item (getting authorisation to access data is time consuming and difficult).

5.3.2.6 Flexibility

The computation of participants' attitudes regarding the extent to which ERP systems are flexible to respond to their needs for changing data, revealed mean scores of the two items used to measure the construct as 2.566 and 2.617, standard deviations from 1.082 to 1.190. Thus, the results were indicating agreement among participants about the flexibility of ERP systems in changing data and getting a quick turnaround for their new reports or data requests.

5.3.2.7 Training

The results disclose that the mean scores of the three items used to measure training were between (3.481 to 3.590) with standard deviation ranging from 1.084 to 1.367, thus indicating that most of the participants have a major problem with ERP systems training programmes because the mean score is higher than the midpoint of (3).

5.3.2.8 Accuracy

Using a five-point Likert scale and two items, the accuracy construct was measured. As shown in appendix (4), the perceived mean score ranged from 2.288 to 2.297 and standard deviations from 0.875 to 0.950. These means scores outline high agreement among participants regarding the data are accurate and sufficient for the academics' purposes.

5.3.2.9 Compatibility

The computation of participants' attitudes regarding the extent to which ERP systems are compatible with their various life aspects, revealed mean scores of the four items used to measure the construct as 2.006 and 2.253, standard deviations from 0.812 to 0.924, indicating agreement among respondents about the compatibility of ERP systems with their academics needs, work, and lifestyle.

5.3.2.10 Currency

Participants' attitudes toward sufficient data to meet academics' needs from ERP systems in Saudi universities were measured by three items. The mean scores were between 2.687 to 3.249 on the five-point scale, therefore, reflecting participants' agreement with two items (first and third), they can get data that are current enough to meet their needs and the data are up-to-date enough for their purposes. However, the disagreement was on the second item (I need some data on the up-to-the-minute status of operations or events but cannot get it).

5.3.2.11 Right Data

Participants were asked to give their opinions concerning three statements related to the extent of the perceived data from ERP systems. The findings revealed that the three items had means over the midpoint, which ranged between 3.050 to 3.555. The results indicated that a high level of disagreement existed among participants regarding this construct. Essentially, participants had difficulty in doing their tasks effectively because some of the needed data were not available and some critical data for academics were missing.

5.3.2.12 Lack of Confusion

Regarding the lack of confusion construct, participants were asked to answer two statements in order to measure the extent of the clarity of data storages and different producers to recall the stored data. The mean scores were 2.674 for (the first item) and 2.945 for (the second item), indicating a level of agreement among the participants. Specifically, while they reported very low agreement on the second statement which related to different producers to recall the stored data in the systems (mean = 2.945), they agreed on the first statement relating to the different ways to store the data in the systems (mean = 2.674). To put it differently, it seems that clarity of data storages in ERP systems is not easily noticeable by other academics.

5.3.2.13 Timeliness

Four items were used to measure the timeliness construct in the current study. The mean scores were ranged between 2.242 to 2.409, with standard deviation between 1.094 to 1.188. For all above items, their mean scores were lower than the midpoint of three on the five-point Likert scale, which indicated the respondents' agreement on the scale measures. The results confirm that the majority of participants agreed ERP systems provide them with the information that they need and the data is regularly updated.

5.3.2.14 Content

The content construct was measured by four items on the five-point Likert scale. All the four items were lower than the midpoint of three with mean scores between 2.170 to 2.409 and with standard deviation between 0.795 to 0.966, which reflect a high level of agreement by the majority of the participants of the current study. This indicates that ERP systems provide reports that seem to be just about exactly what they requested and provide sufficient and precise data that academics could use to complete their tasks.

5.3.2.15 Format

In respect of format construct, respondents reported agreement on all the three items measuring the construct, the mean score ranged between 2.144 to 2.455, falling below the midpoint of 3. Clearly, most participants felt the ERP systems present in an expected and easy format and provide clear information.

5.3.2.16 Reliability

The mean scores for the five items selected to measure the reliability construct ranged from 2.172 to 2.455 with standard deviation between 0.816 to 1.027. The results of reliability construct indicates strong agreement among the participants on the reliability of ERP systems. In more practical terms, it was found that most participants felt happy about the reliability of service provided by the technical support team such as achieving their promises to do something by a certain time and showing sincere interest in solving problems.

5.3.2.17 Responsiveness

Agreement emerged among participants regarding the responsiveness of ERP systems' technical teams. All four mean scores for the four items used to measure the responsiveness construct were above the midpoint (3). The mean scores ranged between 2.562 to 2.660 with standard deviation between 1.293 to 1.400. The results indicated that the majority of the participants were satisfied with the responsiveness of ERP systems' technical teams in term of giving prompt service to users, always willing to help users and technical teams are never too busy to respond to academics' requests.

5.3.2.18 Assurance

In respect of the assurance construct, the majority of participants reported agreement on all the three items measuring the construct, the mean score ranged between 2.181 to 2.374, falling below the midpoint of 3. Clearly, most participants felt the ERP systems support teams provided safe and secure correspondence with academics' users and the support teams are consistently courteous with academic users.

5.3.2.19 Empathy

The mean score for the four items selected to measure the empathy construct ranged from 2.032 to 2.315 with standard deviation between 0.995 to 1.287. The results of the empathy construct indicates strong agreement among the participants on the empathy of ERP systems. In more practical terms, it was found that most participants felt happy about the empathy services provide by the technical support teams and the ERP systems such as ERP systems operating hours convenient to users and support teams usually understand the specific needs of users.

5.3.2.20 Tangible

Participants were asked to give their opinions concerning four statements related to the compatible and up-to-date hardware and software to use the ERP systems. The findings revealed that the four items had means below the midpoint (3), which ranged between 2.396 to 2.619. The results indicated that a high level of agreement existed among the majority of participants regarding this construct. Essentially, participants had the required resources (computers and software) to use ERP systems; moreover, the ERP systems' structure and navigation are usually user-friendly.

5.3.3 Descriptive Analysis and the Dependent Variable

The researcher has applied the independent t-test for the profile questions that include only two groups such as the gender question. On the other hand, One-way ANOVA has been applied for the remaining demographic questions that include more than two factors such as job title and level of qualification. The main reason for applying the above two tests is to confirm if there are differences among the means of the groups when grouped or factored by the DV.

5.3.3.1 Question Number (1 and 7)

The findings suggested that there was no differences between both groups of academics, male and female, regarding their answers concerning the DV, which is in this case academic staff's performance. For the first question the (gender) the results were male (M=2.1, SD=0.55) and female (M=2.2, SD=0.49) conditions; t

(455) = -1.54, p=0.124, which exceeds (0.05). Thus, the null hypothesis is accepted (there is no difference between the two groups' answers). Similarly, the results of the last profile question number seven (administrative duties) shows that there is no difference regarding the questionnaire answers between participants who have been charged with administrative duties besides their academic position and participants who have not been given any administrative duties (Yes or No answer). Where male (M=2.2, SD=0.66) and female (M=2.1, SD=0.46) conditions; t (202.2) =1.34, p=0.183, which exceeds (0.05). Thus the null hypothesis is accepted (there is no statistical difference between the two groups' answers in regards to the administrative duties (Yes or No answer). The following table (5.10) demonstrates the independent t-test results for the first and the seventh question.

Table 5.10: The Independent T-Test Results for the First and the Seventh Question

Question	Gender		N	Mean	SD	t	df	Sig. (2-tailed)
1	CPerf	Male	290	2.1027	.55	-1.54	455	.124
		Female	167	2.1820	.49			
Question	**Charge of Admin. Duties**		**N**	**Mean**	**SD**	**t**	**df**	**Sig. (2-tailed)**
7	CPerf	Yes	140	2.1885	.66	1.34	202.2	.183
		No	317	2.1066	.46			

5.3.3.2 Question Number (2, 3, 4, 5 and 6)

By applying the one-way ANOVA test on the second, third, fourth and sixth demographic questions, the results show that there were statistically significant differences between the groups in the (2, 3, 4 and 6) where $p < 0.05$, therefore, accepting the alternate hypothesis (there is at least one difference between factored means). In each case when the null hypothesis failed to be accepted the post hoc test is required in this situation to point out where the differences between the groups occurs. However, the fifth question regarding the level of experience in using ERP systems has yielded F (5, 451) = 1.60, p-value =0.160, which exceeds (p-value of 0.05). This supported the null hypothesis between the factored means (there is no differences among the factored means). Thus, there was no need to apply a post hoc test on this question. The following table (5.11) demonstrates the one-way ANOVA results for the fifth demographic question.

Table 5.11: One-way ANOVA Results for the Fifth Demographic Question

Descriptives

CPerf

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
Less than 2 Years	46	2.1643	.30764	.04536	2.0729	2.2556	1.28	2.67
3-4 Years	193	2.0766	.53644	.03861	2.0004	2.1527	1.00	3.33
5-6 Years	146	2.1967	.59836	.04952	2.0989	2.2946	1.06	3.61
7-8 Years	34	2.2092	.38394	.06585	2.0752	2.3431	1.22	3.11
9-10 Years	29	2.1188	.58677	.10896	1.8956	2.3420	1.00	2.61
More than 10 Years	9	1.8395	.07579	.02526	1.7812	1.8978	1.78	1.94
Total	457	2.1317	.53024	.02480	2.0829	2.1804	1.00	3.61

ANOVA

CPerf

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	2.230	5	.446	1.597	.160
Within Groups	125.975	451	.279		
Total	128.205	456			

The second question, regarding the level of qualification, had a significance level of (0.000), which infers that there are differences among the groups, where F (2, 454) = 20.1, p-value =0.000, which is less than p-value of (0.05).

The results of the post hoc test indicated that the answers from the three qualification groups (PhD, MSc and BA) show differences in their means from each other, where p-value < 0.05. The following table (5.12) gives the One-way ANOVA results for the second demographic question.

Table 5.12: One-way ANOVA Results for the Second Demographic Question

Descriptives

CPerf

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
PhD	216	2.1139	.54536	.03711	2.0408	2.1871	1.00	3.33
MSc	153	2.3065	.50316	.04068	2.2261	2.3868	1.00	3.61
BA	88	1.8712	.41613	.04436	1.7830	1.9594	1.00	2.67
Total	457	2.1317	.53024	.02480	2.0829	2.1804	1.00	3.61

ANOVA

CPerf

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	10.712	2	5.356	20.696	.000
Within Groups	117.493	454	.259		
Total	128.205	456			

Multiple Comparisons

Dependent Variable: CPerf

Tukey HSD

(I) Academic Qualification	(J) Academic Qualification	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
PhD	MSc	-.19252*	.05375	.001	-.3189	-.0661
	BA	.24273*	.06433	.001	.0914	.3940
MSc	PhD	.19252*	.05375	.001	.0661	.3189
	BA	.43525*	.06806	.000	.2752	.5953
BA	PhD	-.24273*	.06433	.001	-.3940	-.0914
	MSc	-.43525*	.06806	.000	-.5953	-.2752

*. The mean difference is significant at the 0.05 level.

The third question, (which is job title) divided the participants according to their job title. The results were *F* (4, 452) = 12.1, p-value =0.000, which is less than p-value of (0.05). The results indicated that there were differences among the different groups (professors, associate professors, assistant professors, lecturers and teaching assistants) regarding their answers. The further post hoc test indicated that the difference in the mean occurred between assistant professors and lecturers, and between teaching assistants and lecturers with a p-value = 0.000, which is less than p-value of 0.05. The following table (5.13) shows the One-way ANOVA results for the Third demographic question.

Table 5.13: One-way ANOVA Results for the Third Demographic Question

Descriptives

CPerf

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Professor	28	2.1647	.41779	.07896	2.0027	2.3267	1.44	2.61
Associate Professor	36	2.1327	.61122	.10187	1.9259	2.3395	1.22	3.11
Assistant Professor	126	2.0882	.59952	.05341	1.9825	2.1939	1.00	3.33
Lecturer	130	2.3739	.48099	.04219	2.2905	2.4574	1.06	3.61
Teaching Assistant	137	1.9347	.40612	.03470	1.8661	2.0033	1.00	2.67
Total	457	2.1317	.53024	.02480	2.0829	2.1804	1.00	3.61

ANOVA

CPerf

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	13.213	4	3.303	12.984	.000
Within Groups	114.992	452	.254		
Total	128.205	456			

Multiple Comparisons

Dependent Variable: CPerf

Tukey HSD

(I) Job Title	(J) Job Title	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Professor	Associate Professor	.03197	.12709	.999	-.3161	.3801
	Assistant Professor	.07650	.10538	.950	-.2121	.3651
	Lecturer	-.20925	.10509	.272	-.4971	.0786
	Teaching Assistant	.22997	.10461	.182	-.0565	.5165
Associate Professor	Professor	-.03197	.12709	.999	-.3801	.3161
	Assistant Professor	.04453	.09532	.990	-.2165	.3056
	Lecturer	-.24122	.09499	.084	-.5014	.0190
	Teaching Assistant	.19800	.09447	.224	-.0607	.4567
Assistant Professor	Professor	-.07650	.10538	.950	-.3651	.2121
	Associate Professor	-.04453	.09532	.990	-.3056	.2165
	Lecturer	-.28575*	.06306	.000	-.4584	-.1130
	Teaching Assistant	.15347	.06226	.101	-.0170	.3240
Lecturer	Professor	.20925	.10509	.272	-.0786	.4971
	Associate Professor	.24122	.09499	.084	-.0190	.5014
	Assistant Professor	.28575*	.06306	.000	.1130	.4584
	Teaching Assistant	.43922*	.06176	.000	.2701	.6084
Teaching Assistant	Professor	-.22997	.10461	.182	-.5165	.0565
	Associate Professor	-.19800	.09447	.224	-.4567	.0607
	Assistant Professor	-.15347	.06226	.101	-.3240	.0170
	Lecturer	-.43922*	.06176	.000	-.6084	-.2701

*. The mean difference is significant at the 0.05 level.

The fourth question divided the participants regarding their working experience. The results were *F* (4, 452) = 3.91, p-value =0.004, which is less than p-value of (0.05). The above results show that there are differences in the mean among its groups (less than 5, 5-10, 11-15, 16-20 and more than 20 years). By applying the post hoc test, it has indicated that the differences in means occur between participants who have less than 5 years' experience and participants with more than 20 years' working experience in their universities where the p-value = 0.041, which is less than p-value of 0.05. Moreover, the differences appear between participants who have 5 to 10 years' experience and participants with more than 20 years' experience with p-value = 0.001, which is less than a p-value of 0.05. The following table (5.14) gives the One-way ANOVA results for the fourth demographic question.

Table 5.14: One-way ANOVA Results for the Fourth Demographic Question

Descriptives

CPerf

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Less than 5 Years	168	2.1181	.41513	.03203	2.0548	2.1813	1.28	3.22
5-10 Years	163	2.2195	.58975	.04619	2.1283	2.3107	1.00	3.61
11-15 Years	55	2.1414	.49998	.06742	2.0063	2.2766	1.00	2.83
16-20 Years	17	2.1405	.50998	.12369	1.8783	2.4027	1.78	3.33
More than 20 Years	54	1.8961	.63141	.08592	1.7237	2.0684	1.00	3.11
Total	457	2.1317	.53024	.02480	2.0829	2.1804	1.00	3.61

ANOVA

CPerf

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	4.292	4	1.073	3.914	.004
Within Groups	123.913	452	.274		
Total	128.205	456			

Multiple Comparisons

Dependent Variable: CPerf

Tukey HSD

(I) Years of Employment at this Uni	(J) Years of Employment at this Uni	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Less than 5 Years	5-10 Years	-.10144	.05756	.397	-.2591	.0562
	11-15 Years	-.02336	.08134	.999	-.2461	.1994
	16-20 Years	-.02247	.13326	.890	-.3874	.3425
	More than 20 Years	.22197	.08191	.041	-.0024	.4463
5-10 Years	Less than 5 Years	.10144	.05756	.397	-.0562	.2591
	11-15 Years	.07808	.08165	.874	-.1455	.3017
	16-20 Years	.07897	.13345	.976	-.2865	.4445
	More than 20 Years	.32341*	.08221	.001	.0982	.5486
11-15 Years	Less than 5 Years	.02336	.08134	.999	-.1994	.2461
	5-10 Years	-.07808	.08165	.874	-.3017	.1455
	16-20 Years	.00089	.14529	.890	-.3970	.3988
	More than 20 Years	.24532	.10031	.105	-.0294	.5200
16-20 Years	Less than 5 Years	.02247	.13326	.980	-.3425	.3874
	5-10 Years	-.07897	.13345	.976	-.4445	.2865
	11-15 Years	-.00089	.14529	.980	-.3988	.3970
	More than 20 Years	.24443	.14561	.448	-.1544	.6432
More than 20 Years	Less than 5 Years	-.22197	.08191	.041	-.4463	.0024
	5-10 Years	-.32341*	.08221	.001	-.5486	-.0982
	11-15 Years	-.24532	.10031	.105	-.5200	.0294
	16-20 Years	-.24443	.14561	.448	-.6432	.1544

*. The mean difference is significant at the 0.05 level.

For the sixth question, which is based on the extent of which ERP systems once used by academics, the results were *F* (4, 452) = 7.40, p-value =0.000, which is less than p-value of (0.05). Therefore, the null hypothesis failed to be accepted, which means there is at least one difference between factored means (daily, weekly, monthly, annually and other when needed). By running the post hoc test, the differences have been found between participants who use the systems daily and the other groups. To be more specific, the p-value between daily use and weekly use was (0.027), daily use and monthly use was (0.003), daily use and annual use was (0.032) and finally daily use and other (when needed) p-value was (0.013). The following table (5.15) shows the One-way ANOVA results for the sixth demographic question.

Table 5.15: One-way ANOVA Results for the Sixth Demographic Question

Descriptives

CPerf

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean Lower Bound	95% Confidence Interval for Mean Upper Bound	Minimum	Maximum
Daily	284	2.0430	.54085	.03209	1.9799	2.1062	1.00	3.61
Weekly	113	2.2129	.51509	.04846	2.1169	2.3089	1.28	3.61
Monthly	43	2.3488	.38458	.05865	2.2305	2.4672	1.61	2.94
Annually	10	2.4167	.19466	.06156	2.2774	2.5559	2.06	2.56
Other	7	2.6746	.46084	.17418	2.2484	3.1008	2.00	2.94
Total	457	2.1317	.53024	.02480	2.0829	2.1804	1.00	3.61

ANOVA

CPerf

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	7.880	4	1.970	7.400	.000
Within Groups	120.325	452	.266		
Total	128.205	456			

Multiple Comparisons

Dependent Variable: CPerf
Tukey HSD

(I) Using ERPs	(J) Using ERPs	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	95% Confidence Interval Upper Bound
Daily	Weekly	-.16985*	.05739	.027	-.3270	-.0127
	Monthly	-.30580*	.08443	.003	-.5370	-.0746
	Annually	-.37363	.62310	.032	-.8283	.0810
	Other	-.63157*	.19740	.013	-1.1722	-.0909
Weekly	Daily	.16985*	.05739	.027	.0127	.3270
	Monthly	-.13596	.09245	.582	-.3892	.1172
	Annually	-.20379	.17022	.753	-.6700	.2624
	Other	-.46172	.20096	.148	-1.0121	.0887
Monthly	Daily	.30580*	.08443	.003	.0746	.5370
	Weekly	.13596	.09245	.582	-.1172	.3892
	Annually	-.06783	.18114	.996	-.5639	.4283
	Other	-.32577	.21029	.531	-.9017	.2502
Annually	Daily	.37363	.62310	.032	-.0810	.8283
	Weekly	.20379	.17022	.753	-.2624	.6700
	Monthly	.06783	.18114	.996	-.4283	.5639
	Other	-.25794	.25426	.849	-.9543	.4384
Other	Daily	.63157*	.19740	.013	.0909	1.1722
	Weekly	.46172	.20096	.148	-.0887	1.0121
	Monthly	.32577	.21029	.531	-.2502	.9017
	Annually	.25794	.25426	.849	-.4384	.9543

*. The mean difference is significant at the 0.05 level.

To conclude, this section in the analysis chapter has analysed the seven demographic questions based on the dependent variable of this study, which is the academics' performance in order to determine whether there are any differences between the means. An independent t-test has been applied (for questions one and seven on demographics). On the other hand, a One-way ANOVA test has been applied for the remaining of the demographic questions because they contain at least three factored groups. The findings were that questions number (one, five and seven) had a level of significance above (0.05), which means there is no difference in means when factored by the demographic of questions number (one, five and seven). On the other hand, questions number (two, three, four and six) had a significant level less than (0.05), which means there are differences among means when factored by the demographics of questions number (two, three, four and six).

5.4 Inferential Analysis

This section outlines the procedure of the quantitative data analysis by demonstrating the findings of the inferential analyses of Exploratory Factor Analysis (EFA), Confirmatory Factor Analysis (CFA), and Structural Equation Modelling (SEM). Precisely the first sub-section deliberates the data reduction and factor extraction reached via EFA, the second sub-section highlights the results of CFA and discusses the processes of the measurements for model validation. Finally, the last sub-section provides the discussion of the confirmed structural model for the current study and its use in a forecast.

5.4.1 Exploratory Factor Analysis (EFA)

According to Field (2013), testing the validity and the reliability of any research instrument is essential in order to confirm the uniformity and the coherence of the dataset, which will lead in the end to produce accurate and logical results. Therefore, the main aim of running a factor analysis test in the current dataset is to reduce the number of the variables in order to make it more convenient and manageable, and to link each variable to the more suitable construct (Ibid). Additionally, Saunders et al. (2016), have reported that the validity and the reliability can check either if the instruments are able to measure what they expected to measure or not and if they have the ability to reflect the actuality. Thus, in this current study, there are several processes have been applied in order to confirm and check the validity and the reliability of the instruments that have been used.

5.4.1.1 Performing Factor Analysis and Cronbach's Alpha Test

Procedures here have been followed in order to conduct the factor analysis and the Cronbach's alpha tests. Moreover, a justification for each procedure is mentioned to explain the reason why the researcher has chosen that procedure in particular. The first procedure is confirming the reliability and the validity for the current dataset, so in order to achieve the first procedure the researcher has conducted a Cronbach's Alpha test for the overall questions and then excluded any question that weakens the overall consistency and uniformity of the participants (Saunders and Lewis, 2012; Pallant, 2016). According to Field (2013), the acceptable cut off value to determine a good reliability is (0.7), as the higher the value the better the reliability for the dataset. The second procedure is confirming the reliability and the validity by conducting the Cronbach's Alpha test for the overall items of each section in the questionnaire in order to increase the reliability and the validity of this study. The third procedure is to conduct the Cronbach's Alpha for all the variables including the dependent and the independent individually in order to confirm that all items in each variable are linked to each other. The following table (5.16) shows the results for the three steps of the Cronbach's Alpha test that have been applied.

Table 5.16: The Final Results of the Reliability Coefficients of the Research Instrument

Steps	Construct	Items	Cronbach's Alpha	Notes
All Items in the First Section	**The First Section (Academics Performance)**	**10**	**0.958**	**Accepted**
Each Factor in the Second Section (System Quality)	Ease of use	4	0.898	Accepted
	Accessibility	3	0.817	Accepted
	Assistance	2	0.944	Accepted
	Authorization	2	0.791	Accepted
	Flexibility	2	0.828	Accepted
	Training	3	0.837	Accepted
	Accuracy	2	0.866	Accepted
	Compatibility	4	0.900	Accepted
	Currency	3	0.835	Accepted
	Right data	3	0.822	Accepted
	Lack of confusion	2	0.737	Accepted
	Timeliness	4	0.865	Accepted
	Content	4	0.924	Accepted
	Format	3	0.905	Accepted

All Items in the Second Section	**The Second Section (System Quality)**	**41**	**0.888**	**Accepted**
Each Factor in the Third Section (Service Quality)	Reliability	5	0.846	Accepted
	Responsiveness	4	0.856	Accepted
	Assurance	3	0.852	Accepted
	Empathy	4	0.865	Accepted
	Tangible	4	0.925	Accepted
All Items in the Third Section	**The Third Section (Service Quality)**	**20**	**0.816**	**Accepted**
All Scale Items Together	**All constructs' items**	**71**	**0.909**	**Accepted**

The next procedure is executing the factor analysis. According to Tabachnich and Fidell (2007), the appropriate number of participants in order to receive better results from the factor analysis is 300 cases and above. They have reported that if the number of cases is below 150 participants, the results of the factor analysis would be insufficient, unless the high loading maker for variables exceeds (0.8). In the current study, the sample size was 457, which is considered satisfactory and provides a sufficient number of participants to run the factor analysis test.

The factor analysis was undertaken for all the independent scales variables including all their items. In this stage, the results of the factor analysis should not overlap different items from different constructs together. The justification for the previous statement is that each construct has particular characteristics compared to other constructs. Therefore, the constructs of service quality such as reliability, tangibility, and empathy, their items cannot overlap with the system quality constructs such as ease of use, training, currency and authorisation. Thus, the researcher had to delete and exclude some overlapping items not related to the construct. Moreover, another reason for the deletion is that the loading for these items was lower than other related items in the construct. The options that have been selected by the researcher to run the factor analysis can be summarised as follows:

The researcher has chosen the Principal Components Analysis (PCA) without defining the number of factors needed in this study. The justification for choosing the PCA method to be applied in the factor analysis is that PCA tends to be a simpler and easier technique compared to the alternative methods such as Principal Axis factoring, Imaging Factoring and Maximum likelihood (Field, 2013). Moreover, PCA aims to find a line for all the components in the dataset and it represents how each item contributes to each component, whereas, the other methods are focusing on a mathematical model for the estimated and produced factors (Ibid). According to Stevens (2012), if the number of items is larger than 30 and with overall communality (0.7) the differentiation in the results for the above-mentioned methods would be minor, while if there are less than 20 items and their overall communality is less than (0.4) then the differentiation in the results would be major. Additionally, PCA is considered as the most common method used in the factor analysis test among researchers and scholars (Stevens, 2012; Jupp, 2006). Finally, Field (2013) stated that the PCA method resembles discriminant analysis, which is considered as an advantage for choosing PCA.

According to Stevens (2012) the second important option after the chosen factor extraction is the factor rotation method. There are several methods regarding the factor rotation such as oblimin, equamax and varimax (Tabachnich and Fidell, 2007). However, the most common rotation method that has been applied by many researchers and scholars is varimax. It can be considered as the most accepted factor rotation method to produce the simplest structure (Field, 2013; Brown, 2014). Ho (2013) stated that varimax is mathematically able to produce a clear set of factors, therefore, varimax is very popular with researchers and considered as the simplest structure. Based on the above justifications, the present study has selected the varimax rotation method.

The next option, which has been selected by the researcher is listwise in order to exclude any missing values. According to Field (2013) listwise tends to be the safest and the most harmless technique to deal with the missing values compared to other methods or techniques such as pairwise or replacing the missing data with the mean.

The next step is setting the cut off value or suppressing absolute values, which engenders debate in the literature. The importance of the cut off value is to command SPSS to present the loading items that exceed the cut off value. For instance, Field (2013) stated that the cut off value depends on the sample size of the dataset, as the larger the sample size, the smaller the cut off value will be. Stevens (2012) produced a table to suggestion the cut off loading value for a specific sample size, if the sample size is larger than 400 then the suggested cut off loading value is (0.30). Another opinion recommended that the loading value should exceed 0.40 (O'Rourke and Hatchher, 2013). In this study, the researcher has adopted the last recommendation and has set 0.40 value as the absolute value to run the factor analysis.

The next process was to check the communality, which is one of the factor analysis results. The communality aims to assess the common variance, which highlights how each variable participates with the other variables in the dataset; moreover, the results for the communality will be explained in the range of 0 to 1 (Field, 2013). In addition, MacCallum et al. (1999) declared that there is a negative relationship between the sample size and the level of communality, while the dataset which includes less than 100 cases requires a higher communality level than (0.6) and communality level of (0.5) for the dataset with a sample size between 100 to 200 cases. Similarly, Field (2013) agreed that the larger the sample size is, the lower the value for communality is accepted. Moreover, the large number of underlying factors could slightly affect the communality value.

The next process is inspecting the produced factors by factor analysis and its contribution to explain the variances. This stage could be checked through the total variance explained output. The total variance explained table includes three main columns; these three columns are the initial eigenvalues, the extraction sums of squared loading and rotation sum of squared loading. According to Field (2013), the SPSS programme will apply the Kaiser's measure of holding factors with the eigenvalues exceeding number (1), which will be demonstrated in the first section (the initial eigenvalues extraction). The second and the third sections in the table highlight the variance explained for each factor. In this situation, the first factor will represent the highest variances explanation (Pallant, 2016).

A further procedure was applied by the researcher in performing a scree plot analysis in order to confirm the number of factors to be retained (Ibid). According to Field (2013), the scree plot is known as Cattell's scree test, which explains two lines in its figure; the first line or the horizontal line represents the number of components and the second line or the vertical line represents the eigenvalues. The interpretation for the scree plot figure is pointing the elbow in the vertical line when the direction changes to a horizontal and then counting the number of factors that appear in the horizontal line (Field, 2013; Pallant, 2016). According to Stevens (2012), the scree plot depends on the sample size; therefore, the test becomes more reliable and accurate when the sample size of the dataset is higher than 200 cases. Additionally, the importance of the scree plot can be gained by the overestimation of the retained number of factors that are produced by the Kaiser criterion. Thus, the researcher has applied the scree plot test to confirm the results of the Kaiser's criterion test.

The final result in the EFA the rotated component matrix, which is considered as the main result of the varimax rotation method (Field, 2013; Pallant, 2016). Based on the rotated component matrix table the researcher can exclude the low loading items as well as the cross loading items in order to produce better components (Field, 2013).

5.4.1.2 EFA Results for the Current Study

As a starting point, in order to run the factor analysis for the current dataset, the researcher has added all the independent variables to be run through the test. After that, several sets of options have been selected in SPSS 23 to analyse the dataset. These options are the principal component method, varimax rotation method, the Kaiser–Meyer–Olkin measure and Bartlett's test. Indeed, all the options that have been selected already have been justified above in the beginning of this section. The results and its interpretations are presented and highlighted below:

- Indeed, the factor analysis test has been run five times in order to reduce and clean the variables to determine the most suitable underlying variables for the dataset in this present study.
- In each attempt, several items have been excluded; this is because either some of them had cross loadings with more than one construct or these items had low loading.
- The last attempt has shown an accepted 14 factors without cross loading and low loading items. Moreover, all the related items have been produced in a separate factor/construct.

5.4.1.3 Test of Sampling Adequacy and Data Sphericity

After all the options that have been selected and justified, a factor analysis was obtained in order to provide the suitable factors for the dataset variables as well as measure the factorability for running the dataset through two important tests that are aiming to indicate the strength of the output factors. These two test are Bartlett's test for sphericity and the Kaiser–Meyer–Olkin test (KMO). According to Garcia-Santillan et al. (2013), the first test, which is Bartlett's test for sphericity, has to be significant with a p-value lower than (0.05). On the other hand, the second test, which is the Kaiser–Meyer–Olkin test (KMO), aims to assess the sample sufficiency

(Pallant, 2016). The KMO should have a range number between 0 to 1, as the larger the number is better, but it is recommended that the KMO should be higher than (0.06) (Tabachnich and Fidell, 2007). Nevertheless, other scholars have different opinions about the preference number for the KMO such as Kaiser (1974) who reported that the acceptable level of the KMO is starting from (0.05) and a lower value would require the researcher to gather more data to be added in the dataset or reconsider the insertion of some variables. Other researchers such as Hutcheson and Sofroniou (2002) have classified the strength range for the KMO test. They have reported that if the range of KMO indicates between 0.5 to 0.7 the value is mediocre and if the value range is between 0.7 to 0.8 the value is classified as good. If the value indicated is between 0.8 to 0.9, it is classified as great value. Finally if the value of KMO is higher than 0.9 in can be considered as superb value.

The result of the Kaiser–Meyer–Olkin test to confirm the adequacy of the factor analysis sample was (0.817), which is considered as great value based on (Tabachnich and Fidell, 2007; Hutcheson and Sofroniou, 2002; Field, 2013). The following table (5.17) shows KMO and Bartlett's test result.

Table 5.17: KMO and Bartlett's Test Results

Test	Value
Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.817
Bartlett's Test of Sphericity	15592.270
df	1326
Sig.	0.000

The outputs for Bartlett's test for sphericity was χ^2 (1326) = 15592.270, $p < 0.000$. The results for the Bartlett's test have determined that the relationship among the items was adequate for the applied method, which is the principal component method.

5.4.1.4 Communalities Value

The output table for the communalities shows that the lower value was (0.707) for the (Right Data 2) item and the highest value was (0.883) for the (Empathy 1) item. Based on the statement of MacCallum et al. (1999) if the sample size is larger than 200 cases, the communalities for the items have to be in the range of 1 to 0.5. Therefore, all the communalities values for the items are accepted. The following table (5.18) demonstrates the communalities value for all items.

Table 5.18: The Communalities Values of Each Items in All Components					
Items	**Initial**	**Extract.**	**Items**	**Initial**	**Extract.**
Improve Academics' Productivity 1	1.000	.755	**Right Data 3**	1.000	.758
Improve Academics' Productivity 2	1.000	.746	**Timeliness 1**	1.000	.785
Time Taken to Complete Task 1	1.000	.724	**Timeliness 2**	1.000	.868
Time Taken to Complete Task 2	1.000	.789	**Timeliness 3**	1.000	.749
Academics' Confidence and Performance	1.000	.718	**Timeliness 4**	1.000	.732
System Awareness	1.000	.729	**Responsiveness 1**	1.000	.784
Immediate Recall of Information	1.000	.779	**Responsiveness 2**	1.000	.732
Ability to Identify Problem and Solutions 1	1.000	.760	**Responsiveness 3**	1.000	.735
Ability to Identify Problem and Solutions 2	1.000	.770	**Responsiveness 4**	1.000	.792
Ability to Identify Problem and Solutions 3	1.000	.710	**Assurance 1**	1.000	.736
Ease of Use 1	1.000	.842	**Assurance 2**	1.000	.832
Ease of Use 2	1.000	.775	**Assurance 3**	1.000	.820
Ease of Use 3	1.000	.721	**Empathy 1**	1.000	.883
Ease of Use 4	1.000	.755	**Empathy 2**	1.000	.774
Training 1	1.000	.866	**Empathy 3**	1.000	.777
Training 2	1.000	.802	**Empathy 4**	1.000	.875
Training 3	1.000	.782	**Tangible 1**	1.000	.791
Compatibility 1	1.000	.795	**Tangible 2**	1.000	.874
Compatibility 2	1.000	.791	**Tangible 3**	1.000	.880
Compatibility 3	1.000	.767	**Tangible 4**	1.000	.804
Compatibility 4	1.000	.832	**Authorisation 1**	1.000	.827
Currency 1	1.000	.812	**Authorisation 2**	1.000	.834
Currency 2	1.000	.765	**Flexibility 1**	1.000	.854
Currency 3	1.000	.763	**Flexibility 2**	1.000	.863
Right Data 1	1.000	.805	**Lack of Confusion1**	1.000	.795
Right Data 2	1.000	.707	**Lack of Confusion2**	1.000	.807

5.4.1.5 Total Variance Explained

The total variance explained table has shown that the factors that received eigenvalues of more than (1) had a cumulative explanatory percent of 77.006%, with factor one contributing 15.184% alone and the remaining 13 factors varying in contribution from 10.770% for factor two to only 2.155 % for factor 14. The following table (5.19) demonstrates the total variance explained results.

Table 5.19: The Result of the Total Variance Explained

Total Variance Explained

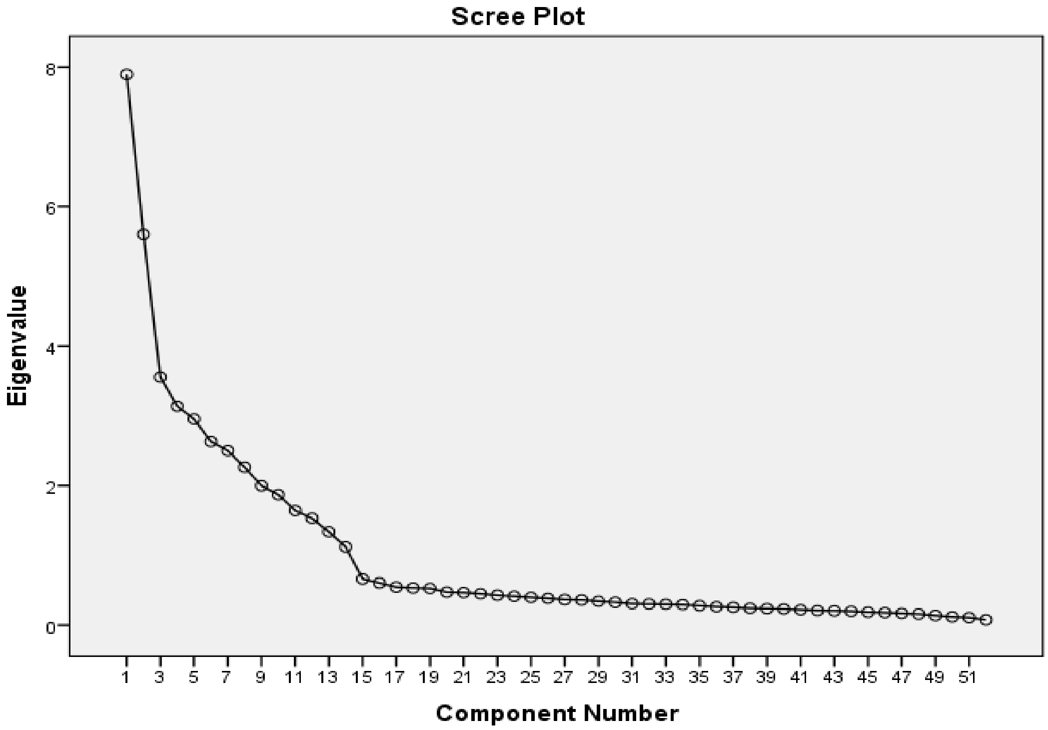
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	7.896	15.184	15.184	7.896	**15.184**	15.184	7.353	14.140	14.140
2	5.601	10.770	25.954	5.601	**10.770**	25.954	3.356	6.455	20.595
3	3.556	6.839	32.793	3.556	**6.839**	32.793	3.141	6.039	26.635
4	3.139	6.036	38.828	3.139	**6.036**	38.828	3.107	5.976	32.610
5	2.954	5.681	44.509	2.954	**5.681**	44.509	2.917	5.609	38.220
6	2.631	5.060	49.569	2.631	**5.060**	49.569	2.917	5.609	43.829
7	2.501	4.810	54.379	2.501	**4.810**	54.379	2.837	5.456	49.285
8	2.264	4.354	58.733	2.264	**4.354**	58.733	2.379	4.574	53.859
9	1.999	3.844	62.577	1.999	**3.844**	62.577	2.348	4.516	58.375
10	1.870	3.597	66.174	1.870	**3.597**	66.174	2.330	4.481	62.857
11	1.642	3.158	69.332	1.642	**3.158**	69.332	2.261	4.349	67.205
12	1.532	2.946	72.278	1.532	**2.946**	72.278	1.740	3.346	70.551
13	1.338	2.573	74.851	1.338	**2.573**	74.851	1.725	3.318	73.869
14	1.121	2.155	77.006	1.121	**2.155**	77.006	1.631	3.137	77.006
15	.662	1.273	78.279						
16	.604	1.161	79.440						
17	.545	1.048	80.488						
18	.533	1.024	81.512						
19	.526	1.012	82.524						
20	.473	.910	83.434						
21	.467	.897	84.331						
22	.450	.865	85.196						
23	.429	.825	86.021						
24	.414	.796	86.817						
25	.397	.764	87.580						
26	.384	.738	88.318						
27	.366	.704	89.022						
28	.361	.693	89.716						
29	.343	.659	90.375						
52	.077	.147	100.000						

Extraction Method: Principal Component Analysis.

5.4.1.6 Screen Plot Test

In order to check the retained number of factors, the researcher has performed a scree plot test. The chart has shown a clear break and the number of components above the elbow is 14 components, which is similar to the result of the rotated component matrix. The following figure (5.9) illustrates the 14 components that have eigenvalues higher than one.

Figure 5.9: The Screen Plot Test for the Factor Analysis Components



5.4.1.7 Rotated Component Matrix

Based on the findings of the rotated component matrix, (14) of the (20) proposed latent factors (constructs) were retained. All the items in the produced factors have loadings greater than (0.7). The researcher has performed the Cronbach's Alpha test independently for each factor to check the reliability for its items. The Cronbach's Alpha test for each factor gave an alpha of more than (0.7), which means all items in each factor are consistent and reliable with the others. The following tables (5.20A) and (5.20B) illustrate the (14) latent factors and their measurement variables resulting from EFA (structural model) and the result for the Cronbach's Alpha test for each factor.

Table 5.20A: Rotated Component Matrix (5th Attempt, Structural Model)

	Component													
	Perf	Tang	Comp	EOU	Time	Empa	Resp	Assu	Tr	Curr	RD	Auth	Flex	LOC
IRI1	.874													
AIPS2	.870													
AIPS1	.862													
IAP1	.859													
IAP2	.848													
SA	.842													
TTCT1	.839													
ACP	.837													
AIPS3	.826													
TTCT2	.818													
Tang2		.912												
Tang3		.903												
Tang1		.863												
Tang4		.847												
Comp4			.865											
Comp1			.843											
Comp3			.827											
Comp2			.808											
EOU1				.910										
EOU2				.877										
EOU4				.859										
EOU3				.844										
Time1					.858									
Time3					.843									
Time4					.825									
Time2					.787									
Emp2						.875								
Emp3						.870								
Emp4						.812								
Emp1						.808								
Resp1							.880							
Resp3							.848							
Resp2							.842							
Resp4							.761							
Assu2								.877						
Assu3								.851						
Assu1								.823						
Tr1									.916					
Tr2									.857					
Tr3									.817					
Curr1										.847				
Curr3										.831				
Curr2										.822				
RD1											.845			
RD3											.832			
RD2											.802			
Auth1												.918		
Auth2												.905		
Flex2													.905	
Flex1													.890	
LOC2														.886
LOC1														.837

Table 5.20B: Rotated Component Matrix (5th attempt) Cronbach's alpha + Total variance Explained		
Component	**Cronbach's alpha**	**Total variance Explained%**
Perf	**0.958**	**15.184%**
Tang	**0.925**	**10.770%**
Comp	**0.900**	**6.839%**
EOU	**0.898**	**6.036%**
Time	**0.873**	**5.681%**
Emp	**0.865**	**5.060%**
Resp	**0.856**	**4.810%**
Assu	**0.852**	**4.354%**
Tr	**0.837**	**3.844%**
Curr	**0.835**	**3.597%**
RD	**0.822**	**3.158%**
Auth	**0.791**	**2.946%**
Flex	**0.828**	**2.573%**
LOC	**0.737**	**2.155%**

To conclude, the following table (5.21) summarises the accepted constructs and items for the structural model and the lost/removed constructs and items, determined by the EFA.

Table 5.21: A summary of the remaining and the removed constructs and items by EFA					
Construct	**No. of Items**	**Deleted Item**	**No. of Item After Deletion**	**Note**	**Comment**
Academics' Performance (Perf)	10	None	N/A	**Accepted**	All items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Ease of Use (EOU)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Responsiveness (Resp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Training (Tr)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Assurance (Assu)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Compatibility (Comp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Empathy (Emp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Currency (Curr)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Tangible (Tang)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70 and a high

					Cronbach's Alpha value was > 0.70
Right Data (RD)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Authorisation (Auth)	2	None	N/A	**Accepted**	The two items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Timeliness (Time)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70 and a high Cronbach's Alpha value was > 0.70
Flexibility (Flex)	2	None	N/A	**Accepted**	The two items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Lack of Confusion (LOC)	2	None	N/A	**Accepted**	The two items had high loading values > 0.70 and a high Cronbach's Alpha value > 0.70
Accessibility (Acce)	3	Acce 1, Acce2 and Acce 3	3	**Removed**	Accessibility construct has been deleted, All three items had low loading values < 0.60
Assistance (Assi)	2	Assi 1 and Assi 2	2	**Removed**	Assistance construct has been deleted, the two items had low loading values < 0.60
Accuracy (Accu)	2	Accu 1 and Accu 2	2	**Removed**	Accuracy construct has been deleted, the two items had low loading values < 0.60
Content (Cont)	4	Cont 1, Cont 2, Cont 3 and Cont 4	4	**Removed**	Content construct has been deleted, all four items had low loading values < 0.60
Format (Form)	3	Form 1, Form 2 and Form 3	3	**Removed**	Format construct has been deleted, the second item (Form 2) had low loading values < 0.60 and the remaining two items had a low Cronbach's Alpha value < 0.70
Reliability (Reli)	5	Reli 1, Reli 2, Reli 3, Reli 4 and Reli 5	5	**Removed**	Reliability construct has been deleted, all four items had low loading values < 0.60

5.4.1.8 The Abbreviations for the Factor

There is a need to abbreviate and reduce the number of letters and words that have been used for each question as well as the constructs in order to streamline the output of the analysis and the presentation of the results. The following table (5.22) shows the abbreviations of the factor analysis constructs and items.

Table 5.22: The Abbreviations for the Factor

Factor Code	Name	Factor Code	Name
Perf	Academics' Performance	Assu	Assurance
Tang	Tangible	Tr	Training
Comp	Compatibility	Curr	Currency
EOU	Ease of Use	RD	Right Data
Time	Timeliness	Auth	Authorisation
Emp	Empathy	Flex	Flexibility
Resp	Responsiveness	LOC	Lack of Confusion

Source: Created by the Researcher.

Two processes have been applied by the researcher regarding the need for abbreviations. These two processes are the factors abbreviations and the questions/statements abbreviations. The first process applied renaming the factors that have one word by the first four letters from that word, but if there is more than one word, it will be replaced by the first letter from each word. For instance, factor number one is that "time taken to complete task" will be replaced with the abbreviation (TTCT). Another example for the factors that have only one word, factor number eight "Accessibility" it will be replace with (Acce).

The second process for the abbreviations is to rename each question by the abbreviated name for the factor that is related to it. An example for the question/ statements abbreviation is that question/statement number (36) "data that would be useful to me are unavailable because I don't have the right authorization" which is related to the authorization factor, therefore, it will be replaced to (Auth1), because it is the first statement in the authorization factor.

5.4.2 SEM (The Best General Model Fit for Factors that Impact Academics' Performance while Using ERP Systems)

Several multivariate analysis techniques such as factor analysis, multiple regression and structural equation modelling (SEM) have been recognised by scholars and researchers; this is because of the enormous power and the ability to examine the hypotheses of their research (Hair et al., 2010). However, several procedures have to be considered before applying such techniques, which are data preparation and data screening. According to Kline (2011), omitting the data screening and preparation could lead to insufficient results and failure of the model estimation. Therefore, data management and screening have been discussed at the beginning of this chapter.

5.4.3 Structural Equation Modelling (SEM)

Many researchers in the ERP systems field have applied SEM technique to their studies (Somers et al., 2003; Amoako-Gyampah and Salam, 2004; Sedera and Gable, 2004; Su and Yang, 2010; Tsai et al., 2011; Almajali et al., 2016; Garg et al., 2017). It has become an essential technique for researchers in social sciences in order to generate a representative model fit that reproduces the original theory or the framework. SEM provides several outputs and indices regarding the model fit, so the extensive contrast in agreement over not only which indices to report but also what the cut-offs for various indices actually are, could overwhelm researchers by the conflicting information available. Therefore, Yuan et al. (2009) argue that it is very important to use the SME technique with appropriate data based on a specified model/framework in order to decrease the conflict of the output indices. Through the several indices that can be produced by the SEM, researchers use these as a guideline to report whether the presented model fit is acceptable or not. Moreover, these indices can highlight the error and the weakness of the model fit.

Additionally, the fit indices can be categorised into three main groups, absolute fit indices, incremental fit indices and parsimony fit indices. So based on the SEM indices, researchers could easily remedy and fix the data in order to achieve the best model fit. In this section, the widely reported model fit indices will be covered as well as how to explain the output values of these fit indices, which will be the guideline for the researcher to carry out in this present study.

5.4.3.1 Absolute Fit Indices

As a starting point, according to McDonald and Ho (2002), the concept of absolute fit indices defines the suitability between the model and the sample data; moreover, it determines the most appropriate model fit. Absolute fit indices include model chi-square (χ^2), Root Mean Square Error of Approximation (RMSEA), Goodness-of-Fit statistic (GFI) and the Adjusted Goodness-of-Fit statistic (AGFI), and finally the Root Mean Square Residual (RMR) and Standardised Root Mean Square Residual (SRMR).

5.4.3.2 Model Chi-Square (χ2)

The Chi-Square value is considered an important measure because it has the ability to appraise the overall model fit. Moreover, it has the ability to assess the inconsistency among the fitted covariance matrices and the sample of the study (Hu and Bentler, 1999). According to Barrett (2007), in case of a good model fit, the Chi-Square value would be higher than (0.05), which means an insignificant result. Therefore, Kline (2011) stated that the Chi-Square measure always denotes the badness of the measurement. While the χ^2 measure has become accepted and popular among researchers in different fields, however, there are a number of limitations regarding its use.

First of all, it assumes that the dataset is normally distributed. However, if serious deviations do exist in the dataset that could result in the model's rejection even though the model has been appropriately identified (McIntosh, 2007). The second restriction is related to the sample size. The χ^2 value could be influenced by the sample size because the statistical significance test is sensitive to the sample size. In other words, the probability of rejecting a model gets higher as long as the sample size gets larger (Joreskog, 1993; Hu and Bentler, 1999; Joreskog et al., 2001). Similarly, Kenny and McCoach, (2003) stated that a low sample size is powerless as the Chi-Square value. Moreover, the value could not indicate whether the model fit is good or poor. Based on the above limitations, researchers have suggested a substitute indicator in order to assess the model fit and minimise the restrictiveness of the Chi-Square test. The normed Chi-Square (χ^2/df) is considered as one of the recommended tests that minimises the effect of sample size (Wheaton et al., 1977). Finally, the most commonly accepted value in the literature regarding the normed Chi-Square is between the values of 2 to 5, preferably lower than two (Arbuckle, 2009) or between 1 to 3 (Kline, 2011). Therefore, the acceptable fit in the current study will be ranged between 1 to 3.

5.4.3.3 Root Mean Square Error of Approximation (RMSEA)

Steiger and Lind (1980) produced the root mean square error of approximation (RMSEA) measure in order to show researchers the range of the model fit, which leads to the selection of the appropriate model for the population covariance matrix (Steiger, 1990; Byrne, 1998). According to Diamantopoulos and Siguaw (2000), RMSEA has become an important measure and one of the most informative fit indices as its sensibility tends to be high with the number of estimated parameters in the model. There is a debate in the literature regarding the accepted extent of the RMSEA value. MacCallum et al. (1996) stated that the accepted and fair value range is between (0.05) to (0.10) and between (0.08) to (0.10) is considered as a mediocre fit. Any value higher than (0.10) can be considered as a poor fit and lower than (0.05) indicates a good fit. Similarly, other scholars have agreed that the good fit can be represented with a RMSEA value less than (0.07) or (0.06) (Hu and Bentler, 1999; Steiger, 2007). In this study the acceptable fit for RMSEA will be lower than 0.05.

5.4.3.4 Goodness-of-Fit Statistic (GFI) and the Adjusted Goodness-of-Fit Statistic (AGFI)

Joreskog (1993) have formed the goodness-of-fit (GFI) indicator as a substitute to the Chi-Square assessment and to analyse the proportion of variance that is calculated by the estimated population covariance (Tabachnick and Fidell, 2007). The range of this indicator is between 0 to 1 and the higher the value of GFI the better the model fit will be. According to Sharma et al. (2005), there is a direct impact on the GFI, the number of degrees of freedom and the number of parameters. This relation can be explained as follows: as the number of degrees of freedom increases, the value of the GFI will decrease. However, if the number of parameters increases the GFI value will increase too. Moreover, there is a positive relationship between sample size and the GFI, which can be explained as the higher the sample size the higher the GFI value (Bollen, 1990; MacCallum and Hong, 1997; Miles and Shevlin, 1998). The accepted GFI value is (0.90); however, if the factor loading and the sample of the study are low then a GFI value of (0.95) is to be recommended (Miles and Shevlin, 1998). Sharma et al. (2005) have suggested another indicator, which is the adjusted goodness-of-fit statistic (AGFI) in order to replace the GFI. The AGFI mainly adjusted the GFI based on the degree of freedom (Tabachnick and Fidell, 2007). The AGFI recommended value is very similar to the GFI and its range is between zero to one. Moreover, AGFI can be affected by the sample size, which can be explained as the larger the sample size the higher the AGFI value. In this study, the acceptable fit will be higher than 0.90.

5.4.3.5 Root Mean Square Residual (RMR) and Standardised Root Mean Square Residual (SRMR)

The root mean square residual (RMR) and the standardised root mean square residual (SRMR) are the square root of the difference between the residuals of the sample covariance matrix and the hypothesised covariance model. The range of the RMR is calculated based upon the scales of each indicator; therefore, if a questionnaire contains items with varying levels (some items may range from 1 – 5 while others range from 1 – 7) the RMR becomes difficult to interpret (Kline, 2011). However, some researchers suggested that a good fit value for RMR is below to 0.05 (Hooper et al., 2008; Hair et al., 2010; Kenny, 2011). The standardised RMR

(SRMR) resolves this problem and therefore it is considered as much more meaningful to interpret. Values for the SRMR range from zero to 1 with well-fitting models obtaining values less than .05 (Byrne, 1998; Diamantopoulos and Siguaw, 2000), However, a value higher than 0.08 is deemed acceptable (Hu and Bentler, 1999). An SRMR value of zero indicates perfect fit but it must be noted that SRMR will be lower when there is a high number of parameters in the model and models based on large sample sizes. In the current study, the acceptable fit will be below 0.05.

5.4.3.6 Incremental Fit Indices

There are different names for incremental fit indices; it can be known as the comparative or the relative fit indices (Miles and Shevlin, 2007). According to McDonald and Ho (2002), incremental fit indices can be defined as a cluster of indices, which compare the Chi-Square value to a standard model and the null hypothesis for this standard/baseline model can be explained as no correlations among all the variables.

5.4.3.7 Normed-Fit Index (NFI)

Hu and Bentler (1999) have proposed the normed-fit index (NFI) in order to evaluate the model by comparing the χ^2 value of the null model with the χ^2 value of the baseline model, where the null model in this case is the worst scenario because no variables are correlated with each other. The NFI value is ranged between 0 to 1, whereas, the recommended and accepted value is (0.90) and higher in order to indicate a good model fit (Ibid). Another opinion by Hooper et al. (2008) suggested that the cut off for a good model fit should be (0.95) and higher. However, NFI can be affected by the sample size; thus, Kline (2011) suggested that researchers do not depend on the NFI only regarding the good fit of the model. Therefore, researchers have recommended a new index that solves the problem of the sample size faced by the previous index. The proposed index is the non-normed fit index (NNFI) also known as the Tucker-Lewis index (Kline, 2011). The accepted value for the NNFI is above (0.80) and higher; however, Bentler and Hu (1999) suggested that the accepted value of NNFI is (0.95) and higher. In the current study, the acceptable fit value will be higher than 0.95.

5.4.3.8 Comparative Fit Index (CFI)

According to Byrne (2013), the comparative fit index (CFI) has been developed from the NFI indicator to solve the problem that may be faced because of the sample size. Therefore, Fan et al. (1999) stated that the CFI index is one of the most important and commonly reported fit indices by researchers. The CFI indicator has the ability to produce a genuine result regarding the model fit even if the sample size is small (Tabachnick and Fidell, 2007). This index assumes that all the potential variables are not correlated with each other. The next procedure is to compare the sample covariance matrix with this null model (Kline, 2011). The range of the CFI index result is between 0 to 1 and the accepted value to indicate a good model fit is (0.90) or higher (Hu and Bentler, 1999). In the current study, the acceptable fit for CFI will be higher than 0.90.

5.4.3.9 Parsimony Fit Indices

These kinds of indices mainly depend on the dataset sample, which could lead to a weak result regarding the model fit indices (Crowley and Fan, 1997). However, Mulaik et al. (1989) proposed two indicators in order to solve the above problem that can be faced by using the parsimony fit indices. These two indexes are the Parsimony Goodness-of-Fit Index (PGFI) and the Parsimonious Normed Fit Index (PNFI). The first index, which is PGFI depends on the GFI indictor by adjusting the degrees of freedom while the second index relies on the NFI also by adjusting the degrees of freedom (Mulaik et al., 1989). The suggested value for both sets of indices according to Mulaik et al. (1989) is similar to the other fit indexes, which have been described earlier.

5.4.4 Reporting Fit Indices

Regarding the issue of what and how many indices any researcher should have to report, in fact, there is no minimum or maximum number that is essentially required to be included in the study, which could confuse and complicate things for some. There is no particular combination of indices that could determine the best fit for a model (Crowley and Fan 1997). This is because different indices reflect dissimilar characteristics and aspects of the model fit (Kline, 2011; Hayduk et al., 2007). However, McDonald and Ho (2002) stated that the most important indices that should be reported are the CFI, GFI, NFI and the NNFI. Another suggestion by Hu and Bentler (1999) is undertaking SRMR indices with the NNFI (TLI), RMSEA or the

CFI. Kline (2011) stated that the important indices that should be reported are the Chi-Square test, the RMSEA, the CFI and the SRMR. Similarly, Boomsma (2000) has recommended similar indices and suggested the squared multiple correlations of each equation to be reported as well. The following tables (5.23A) and (5.23B) summarise some of the accepted values for the commonly reported indices.

Table 5.23A: Summary Absolute Fit Indices (Acceptable Values)

Fit Index	Acceptable Threshold Levels	Description	Reference
Chi-Square χ^2 Statistic	(p-value > 0.05)	Appraise the overall model fit	(Hu and Bentler, 1999; Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013).
Normed Chi-Square χ^2	Between 1 to 2 (Tabachnik and Fidell, 2007). Between 1 to 3 (Kline, 2005). Acceptable ration 2-5, preferable lower than 2 (Arbuckle, 2009).	Adjusts for sample size.	(Tabachnik and Fidell, 2007; Kline, 2011; Arbuckle, 2009)
Root Mean Square Error of Approximation (RMSEA)	Value less than 0.05	Has a known distribution. Favours parsimony. Values less than 0.03 represent excellent fit.	(Steiger, 2007; Hu and Bentler, 1999; Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
GFI	Values greater than 0.90	Scaled between 0 and 1, with higher values indicating better model fit. This statistic should be used with caution.	(Hooper et al., 2008; Arbuckle, 2009; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
AGFI	Values greater than 0.90	Adjusts the GFI based on the number of parameters in the model. Values can fall outside the 0-1.0 range.	(Hu and Bentler, 1999; Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013).
RMR	Value less than 0.05	Residual based. The average squared differences between the residuals of the sample covariances and the residuals of the estimated covariances. Unstandardised.	(Hu and Bentler, 1999; Tabachnik and Fidell, 2007; Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013).
SRMR	Value less than 0.05	Standardised version of the RMR. Easier to interpret due to its standardised nature.	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)

Table 5.23B: Summary of Incremental Fit Indices (Acceptable Values)			
Incremental Fit Indices			
NFI	Values greater than 0.90	Assesses fit relative to a baseline model, which assumes no covariances between the observed variables, has a tendency to overestimate fit in small samples.	(Hu and Bentler, 1999; Tabachnik and Fidell, 2007; Hooper et al., 2008; Arbuckle, 2009; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NNFI (TLI)	Values greater than 0.95	Non-normed, values can fall outside the 0-1 range. Favours parsimony. Performs well in simulation studies (Sharma et al., 2005; McDonald and Marsh, 1990)	(Hu and Bentler, 1999; Tabachnik and Fidell, 2007; Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
CFI	Values greater than 0.95	Normed, 0-1 range.	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)

In the current study, several indices have been reported based on the above recommendations by researchers and scholars; moreover, the chosen indices have not shown any sensitivity to the sample size. Therefore, the selected indices are the Chi-Square (χ^2) value, its degrees of freedom and p value, CFI, GFI, NFI, NNFI (TLI), RMSEA and SRMR.

5.4.5 Improving the Model Fit

The advanced statistics and the complexity of structural equation modelling commonly lead to a poor fit for the proposed model that is derived from the exploratory factor analysis. However, there are several processes which can be applied in order to improve the indices of the model fit (Byrne, 2001). These several processes depend on the provided modification indices recommended by the AMOS programme in order to highlight potential relationships between parameters and re-appoint these relationships (Schumacker and Lomax, 2012). The first step is by determining each construct in the model to check if any of its items cause any weakness for the whole construct. In the end, any items that received a low multiple regression (r^2) lower than (0.20) can be excluded from the construct. This is because the items with lower r^2 indicate very high levels of error (Schumacker and Lomax, 2012). The second step, which could be applied is that each construct should be modelled in a combination with the other constructs in the proposed model in order to decide if the discriminant validity has been obtained or not. The third step to improve the model fit can be used through the Phi (φ) value between two constructs having similar covariance. If the Phi (φ) value is equal to (1.0) that means the two constructs are assessing one thing. Additionally, if the Phi (φ) value exceeds (1.0) further examinations of item cross-loadings need to be executed in order to exclude any cross loadings items (Bagozzi et al., 1991). The next way to improve the model fit, according to Gerbing and Anderson (1988), is to correlate error terms with each other. However, if any researcher decided to correlate errors with each other, a reasonable justification for each correlation is highly essential (Joreskog, 1993).

5.4.6 Confirmatory Factor Analysis (CFA)

CFA indicates the structure of the covariance matrix of the measures by assessing the model's parameters in order to compare the estimated model's parameters with the empirical covariance matrix. If the results of the two compared matrices have relied on each other, the CFA can be defined as an acceptable measurement.

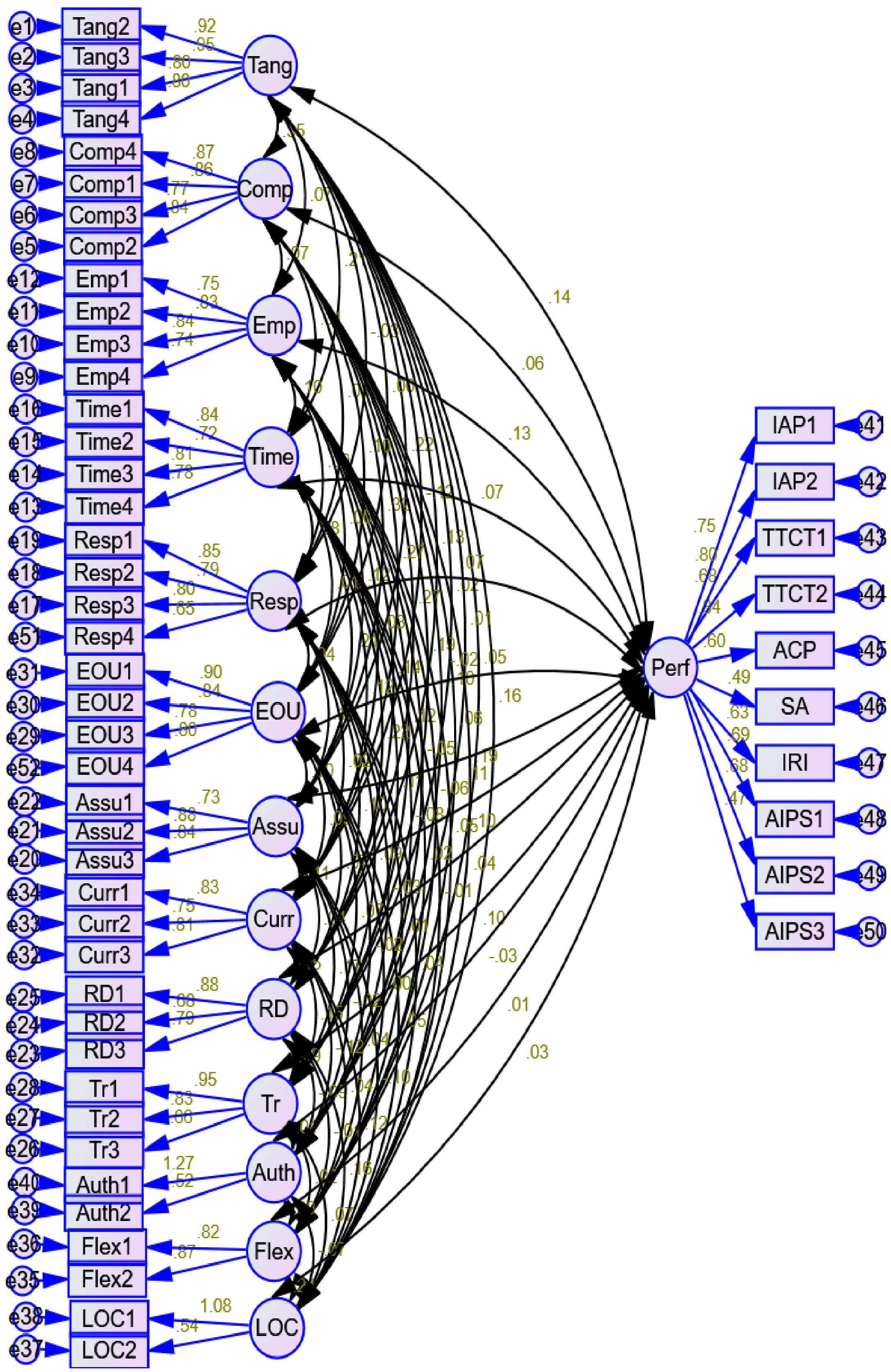
In the present study, the researcher has exported the output of the exploratory factor analysis from SPSS to the AMOS programme in order to confirm the constructs of the exploratory factor analysis and to propose a general model for the ERP systems factors that significantly impact the academics' performance. The AMOS programme has been preferred and chosen in the current study because it depends on the multivariate analysis, which reflects the complex correlations among the different constructs in the proposed model. Indeed, fourteen (14) constructs have been exported from the final attempt of the EFA. The following table (5.24) summarises the output of the final factor analysis attempt that will be analysed in the AMOS programme.

Table 5.24: The Results of the Exploratory Factor Analysis

Title	Description
Number of Constructs	14
Number of items	52
KMO measure of sampling adequacy	0.817
Bartlett's test of sphericity	χ^2 (1326) = 15592.270, p = 0.000).
Total variance Explained%	77.72%
Used method	Principal Component Analysis
Rotation method	Varimax
Cronbach's alpha	Higher than (0.70)

The first run for AMOS has indicated slightly poor fit indices for the proposed model measurement. Based on the recommendation of Kline (2011) the fit indices that should be reported are the normed Chi-squared, the RMSEA, the CFI, and the SRMR. The RMR was (0.047), which is considered as an accepted value because it is lower than (0.05). The GFI was (0. 869), which is less than the acceptable value of (0.90). The CFI value was (0.925), which is above the accepted level of (0.90) and the NFI was (0.866), which is less than the accepted level of (0.90). The following figure (5.10) illustrates the first run of the measurement model.

Figure 5.10: Measurement Model (The First Run)



The following table (5.25) outlines a summary of the reported indices for the first run in AMOS.

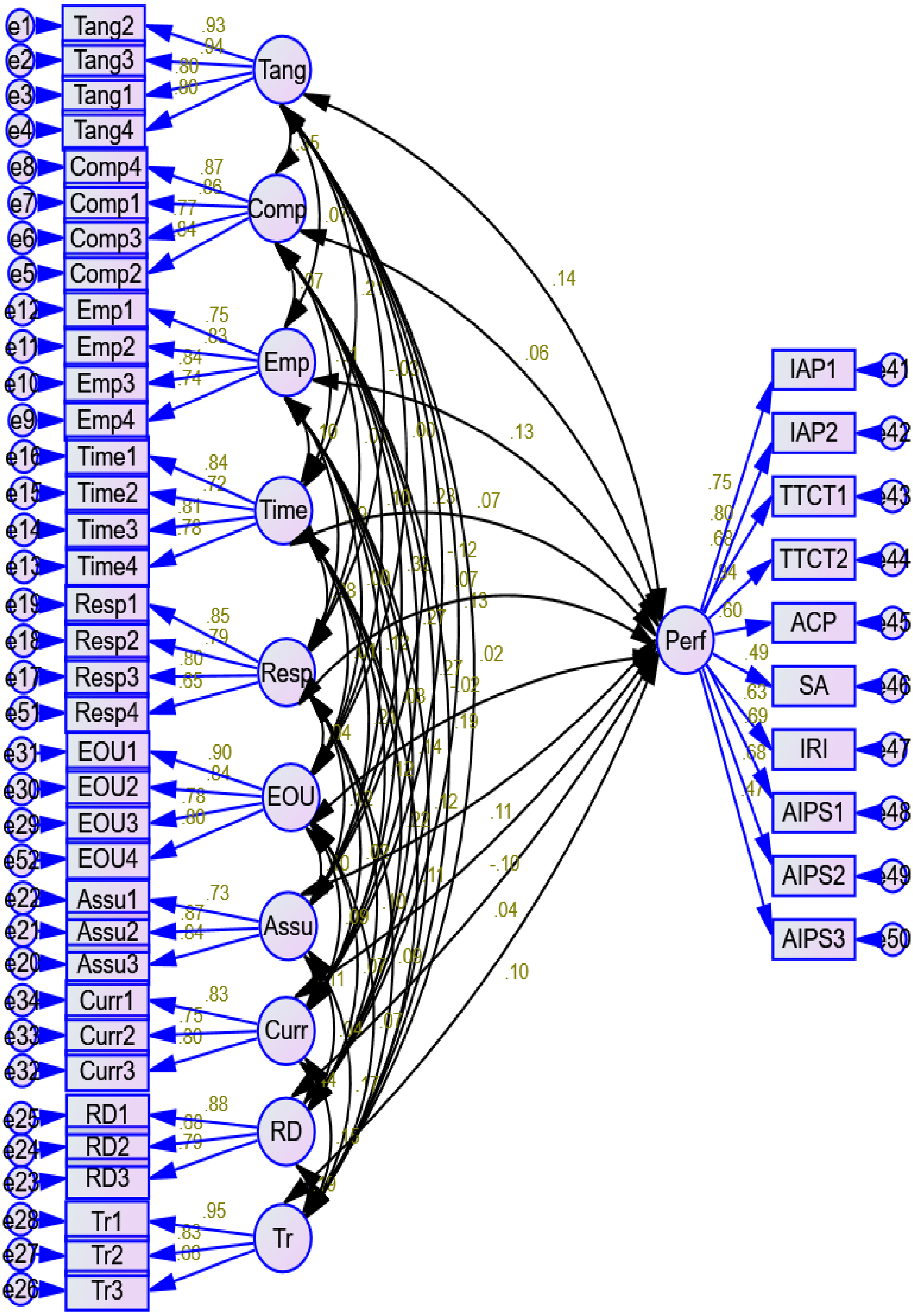
Table 5.25: A Summary of the Reported Indices for the First Run				
Fit Index	**Reported Index Value**	**Recommended Criteria**	**Note**	**Reference**
Normed Chi-Square χ^2	**2.072**	Less than 3	**Accepted**	(Tabachnik and Fidell, 2007; Kline, 2011; Arbuckle, 2009)
RMR	**0.047**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
GFI	**0. 869**	Higher than 0.90	**Unsatisfactory**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NFI	**0.866**	Higher than 0.90	**Unsatisfactory**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NNFI (TLI)	**0.913**	Higher than 0.95	**Unsatisfactory**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
CFI	**0.925**	Higher than 0.95	**Unsatisfactory**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
RMSEA	**0.048**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)

The results of the first run have shown that the second item of the LOC construct (LOC2) has received a low loading, which was (0.54). Similarly, the first item of the Auth construct (Auth2) has received a low loading, which was (0.52). Moreover, another item has resulted in negative variances scores, which is the first item in the Flex construct (Flex1).

According to Byrne (2013), if items received a low loading or negative score, it could cause a problematic issue to the model fit. Therefore, the researcher adjusted the model by excluding the three items, which resulted in the removal of the three above constructs; this is because any construct should include at least two items or more and by excluding the three items, each construct will only be included in one item. The results of the model fit indices in the second run have been fairly improved.

The indices were as follows: the RMR was (0.045), the GFI was (0.887), the CFI value was (0.940), and the NFI value was (0.889). The following figure (5.11) illustrates the second run of the measurement model:

Figure 5.11: Measurement Model (The Second Run)



The following table (5.26) summarises the reported indices values for the second run in AMOS.

Table 5.26: A Summary of the Reported Indices for the Second Run				
Fit Index	**Reported Index Value**	**Recommended Criteria**	**Note**	**Reference**
Normed Chi-Square χ^2	**2.050**	Less than 3	**Accepted**	(Tabachnik and Fidell, 2007; Kline, 2011; Arbuckle, 2009)
RMR	**0.045**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
GFI	**0.887**	Higher than 0.90	**Unsatisfactory**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NFI	**0.889**	Higher than 0.90	**Unsatisfactory**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NNFI (TLI)	**0.931**	Higher than 0.95	**Unsatisfactory**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
CFI	**0.940**	Higher than 0.95	**Unsatisfactory**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
RMSEA	**0.048**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)

In addition, the following table (5.27) outlines the accepted constructs and items for the measurement model and the lost/removed constructs and items, determined by the CFA (second run).

Table 5.27: A Summary of the Remaining and the Removed Constructs and Items by CFA (The Second Run)					
Construct	**No. of Items**	**Deleted Item**	**No. of Item After Deletion**	**Note**	**Comment**
Academics' Performance (Perf)	10	None	N/A	**Accepted**	All items had high loading values > 0.70
Ease of Use (EOU)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Responsiveness (Resp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Training (Tr)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Assurance (Assu)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Compatibility (Comp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Empathy (Emp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70

Currency (Curr)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Tangible (Tang)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Right Data (RD)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Timeliness (Time)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Authorisation (Auth)	2	Auth 1 and Auth 2	2	**Removed**	The two items had low loading values < 0.60, which was 0.52
Flexibility (Flex)	2	Flex 1 and Flex 2	2	**Removed**	The two items had low loading values < 0.60 and both items had negative variances score
Lack of Confusion (LOC)	2	LOC 1 and LOC 2	2	**Removed**	The two items had low loading values < 0.60, which was 0.54

However, several important indices have not reached the acceptable level. Therefore, the researcher has checked the standardized residual covariance matrix in order to highlight the items that have received values higher than (2). This is because items that received values higher than (2) could affect the indices of the model fit (Joreskog and Sorbom, 1986). The following figure (5.12) demonstrates the standardized residual covariance values for the items.

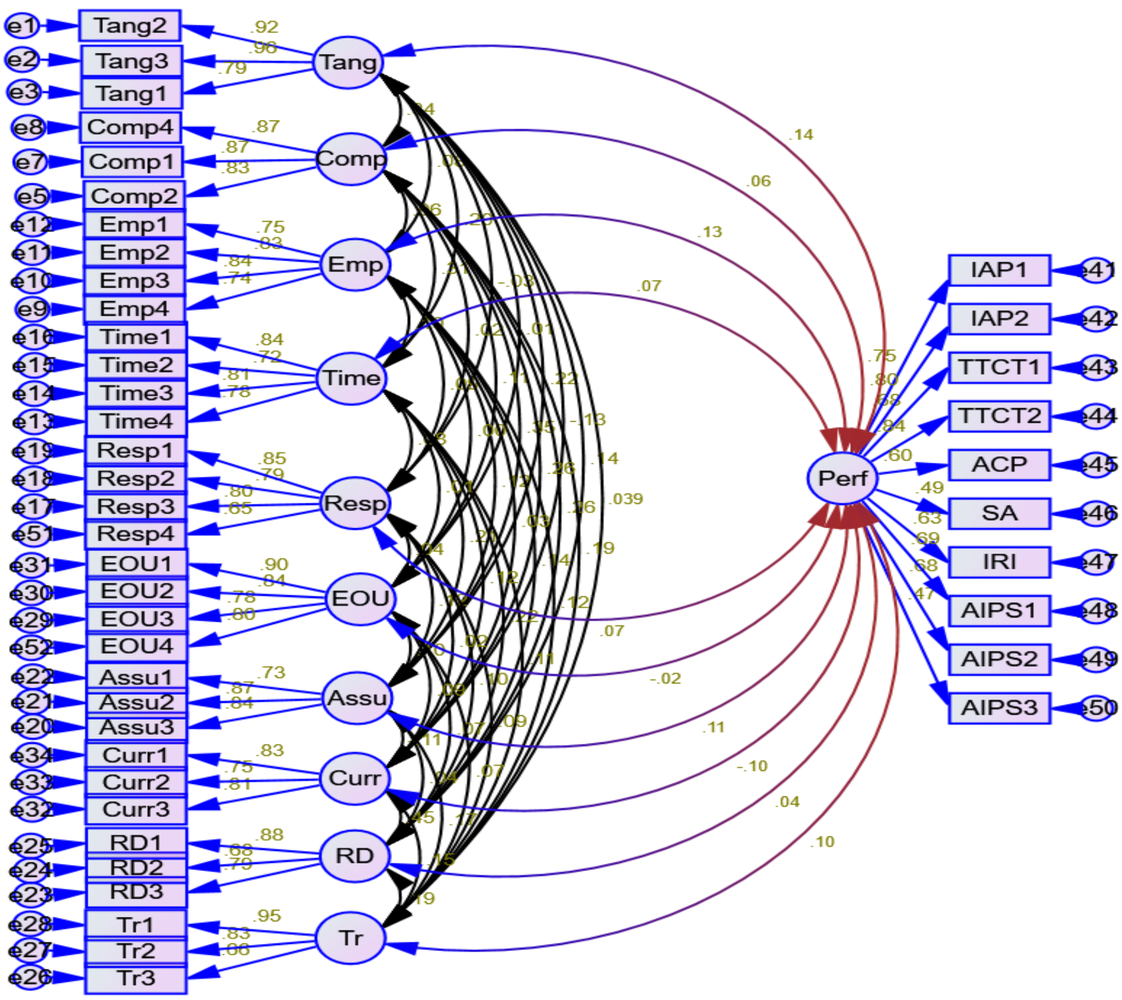
Figure 5.12: The Standardized Residual Covariance Values

	Q3.10.1	Q3.10.3	Q3.10.2	Q4.5.2	Q3.9.1	Q3.9.2	Q3.9.3	Q3.6.1	Q3.6.2	Q3.6.3	Q4.3.2	Q4.3.3	Q4.3.1	Q4.2.1
Q3.10.1	0													
Q3.10.3	0.033	0												
Q3.10.2	-0.067	0.018	0											
Q4.5.2	-1.096	-0.712	-0.388	0										
Q3.9.1	-0.884	-0.915	-1.058	-0.636	0									
Q3.9.2	1.566	0.611	-0.613	0.339	0.12	0								
Q3.9.3	0.655	-0.21	0.772	-2.238	0.001	-0.145	0							
Q3.6.1	0.163	-0.704	0.173	-0.603	-1.318	-0.154	0.212	0						
Q3.6.2	0.107	0.895	0.553	0.629	1.738	1.534	2.598	-0.004	0					
Q3.6.3	0.153	-0.55	-0.276	-0.809	-0.24	-0.013	0.277	0.087	-0.315	0				
Q4.3.2	-0.359	-1.187	-0.567	-1.251	-0.609	0.111	-0.372	-0.106	0.334	0.716	0			
Q4.3.3	1.762	0.807	1.812	1.76	0.939	1.682	1.816	0.549	0.772	1.13	0.015	0		
Q4.3.1	-0.851	-2.192	-0.674	0.364	-1.882	-1.095	-2.195	-1.477	-0.683	-0.467	0.173	-0.259	0	
Q4.2.1	-0.95	-0.463	-0.163	0.813	-0.107	-0.652	-0.091	0.308	-0.204	-0.004	0.323	0.924	-1.011	0
Q4.2.3	1.016	0.745	1.113	0.331	0.321	0.514	0.865	0.212	-0.361	-0.13	-0.352	1.211	-0.249	-0.109
Q4.2.2	0.067	-0.09	1.472	-1.202	-0.616	-0.536	0.18	-0.251	-1.531	-0.561	-0.679	0.444	-1.603	0.002
Q4.2.4	-0.78	-0.307	0.013	-1.065	-0.006	0.544	0.223	0.371	-0.208	0.796	-0.919	0.565	-0.505	0.26
Q4.4.2	-1.165	-1.142	0.618	-0.333	-0.596	-1.847	-1.225	-0.782	0.018	-1.189	-0.632	-0.535	-0.122	-0.737
Q4.4.3	0.179	-0.676	0.682	-0.461	1.174	0.231	-0.063	-0.438	0.783	-1.421	0.53	0.229	1.121	0.404
Q4.4.4	0.129	0.357	1.103	-0.337	0.949	-0.863	0.122	0.313	1.002	-1.012	-0.376	-0.373	-0.008	0.858
Q4.4.1	0.911	0.664	1.662	-0.108	0.915	1.489	0.023	1.245	1.718	0.194	0.065	0.647	-0.435	-0.084
Q3.12.1	-0.37	0.317	-0.747	0.126	1.08	-0.356	1.632	-0.713	0.608	-0.714	-0.766	0.765	0.441	0.233
Q3.12.3	-0.292	1.172	-0.657	0.177	0.571	-1.474	0.004	-0.851	0.082	-1.559	-0.874	-0.22	0.909	0.696
Q3.12.4	-0.204	0.029	-0.451	-0.277	-0.091	-2.396	-0.839	0.972	2.027	1.195	-0.024	1.185	1.478	0.94
Q3.12.2	0.205	0.524	1.666	1.209	0.147	-1.162	0.133	0.379	1.292	-0.745	-1.246	0.228	-0.077	0.106
Q3.1.1	0.668	0.305	0.028	-0.732	-0.087	0.769	-0.547	-0.019	-0.447	-0.778	-0.051	-0.041	0.054	0.023
Q3.1.2	-0.291	-0.919	-0.512	-0.09	0.097	0.201	-0.544	0.218	-0.095	-0.677	-0.383	-0.653	-0.335	-0.103
Q3.1.4	-0.072	0.162	-0.307	-0.476	0.336	0.462	-0.522	0.576	0.94	0.404	1.035	0.601	0.377	-1.053
Q3.1.3	-0.338	0.219	-1.13	0.281	0.357	-0.01	-0.097	-0.569	0.198	-0.938	-0.182	-0.099	-0.037	-1.008
Q3.8.4	-0.42	-0.668	1.965	-1.578	0.658	-0.345	-0.305	-0.807	1.648	-1.15	0.601	0.86	-1.39	-0.485
Q3.8.1	0.351	-1.312	1.13	-1.649	0.826	0.215	-0.957	-0.066	1.095	0.051	-0.377	0.968	-0.896	-0.068
Q3.8.3	0.42	0.699	0.794	-0.561	2.985	1.003	-0.963	-0.875	0.774	-1.418	-2.24	-2.8	-2.327	1.138
Q3.8.2	-1.113	0.686	0.578	-0.83	-0.231	-0.066	-2.38	0.481	2.298	-0.839	-0.261	2.994	1.501	0.683
Q4.5.3	0.263	0.468	1.195	0.105	0.129	1.506	-1.912	-0.2	0.786	-0.504	-2.014	1.962	0.375	0.693
Q4.5.1	-0.46	0.54	0.754	-0.259	2.122	2.08	0.204	-1.176	0.544	-1.122	-2.764	0.878	-0.595	0.548
Q4.5.4	-0.409	0.897	2.496	-0.052	2.352	3.184	0.838	2.301	2.52	0.359	-0.659	3.582	1.389	0.734

It can be clearly seen which two items have standardized residual covariance higher than (2). These two items are the fourth item of Tang construct (Tang4) and the third item of Comp construct (Comp3). Therefore, in order to improve the fit indices of the proposed model, the two items have been excluded.

The last attempt after excluding the above two items, has reached the accepted level of confirmatory fit indices. The following figure (5.13) illustrates the measurement model for the final run.

Figure 5.13: Measurement Model (The Final Run)



The results of the fit indices for the final measurement model are as follows; the GFI value was (0.908), the normed Chi-Square (CMIN/DF) was (1.733), the RMR was (0.043), the NFI was (0.909), the TLI was (0.952), and the RMSEA was (0.040). Based on the above results, it can be concluded that the above measurement model as presented in figure (5.9) can be considered as a confirmatory measurement; therefore, it can be used in the next stage of analysis. The following table (5.28) summarises the reported indices values for the final run in AMOS.

Table 5.28: A Summary of the Reported Indices for the Final Run				
Fit Index	**Reported Index Value**	**Recommended Criteria**	**Note**	**Reference**
Normed Chi-Square χ^2	**1.733**	Less than 3	**Accepted**	(Tabachnik and Fidell, 2007; Kline, 2011; Arbuckle, 2009)
RMR	**0.043**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
GFI	**0.908**	Higher than 0.90	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NFI	**0.909**	Higher than 0.90	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NNFI (TLI)	**0.952**	Higher than 0.95	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
CFI	**0.959**	Higher than 0.95	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
RMSEA	**0.040**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)

In addition, the following table (5.29) outlines the accepted constructs and items for the measurement model and the lost/removed constructs and items, determined by the CFA (first run).

Table 5.29: A Summary of the Remaining and the Removed Constructs and Items by CFA (The Final Run)					
Construct	**No. of Items**	**Deleted Item**	**No. of Item After Deletion**	**Note**	**Comment**
Academics' Performance (Perf)	10	None	N/A	**Accepted**	All items had high loading values > 0.70
Ease of Use (EOU)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Responsiveness (Resp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Training (Tr)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Assurance (Assu)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Compatibility (Comp)	4	Comp3	3	**Three Items Accepted**	Three items had high loading values > 0.70. However, the

					standardised residual covariance value for (Comp3) item was > 2, so it has been removed.
Empathy (Emp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Currency (Curr)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Tangible (Tang)	4	Tang4	3	**Three Items Accepted**	Three items had high loading values > 0.70. However, the standardised residual covariance value for (Tang4) item was > 2, so it has been removed
Right Data (RD)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Timeliness (Time)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70

Based on the above Indices that have been reported in the final run, the measurement model has been confirmed and now it can be considered as a stable measurement model for the context of the current study. However, a final test has to be applied before performing the SEM, which is the measurement model evaluation in order to assess the validity and the reliability of the confirmed model measurement.

5.4.7 The Measurement Model Assessment

5.4.7.1 Reliability Assessment of the Measurement Model

Before performing the SEM for the confirmed measurement model, the assessment of the composite reliabilities is essential to be checked for the model constructs. The results of Composite Reliability (CR) that can be outlined by SEM are providing a better reliability estimation than the results that can be outlined by applying the Cronbach's alpha coefficient in SPSS (Peterson and Kim, 2013). Thus, presenting CR in the current study was a means of providing another reliability test to judge the accuracy of the findings obtained from Cronbach's alpha coefficient test earlier in the current chapter. The following table (5.30) demonstrates the findings of the CR reliability test for all constructs in the current study. Indeed, CR values for all constructs are showing high CR coefficients that were all above the cut-off point of 0.7, thus demonstrating satisfactory internal consistency.

Table 5.30:The Findings of the CR Values for all Constructs		
Construct	**No. of Items**	**CR Value**
Currency	3	**0.837**
Tangible	3	**0.920**
Compatibility	3	**0.892**
Empathy	4	**0.870**
Timeliness	4	**0.867**
Responsiveness	4	**0.859**
Assurance	3	**0.855**
Right Data	3	**0.831**
Training	3	**0.861**
Ease of Use	4	**0.899**
Academics' Performance	10	**0.889**

5.4.7.2 Construct Validity Assessment of the Measurement Model

According to Hair et al. (2010), construct validity can be measured by two important methods of validity, convergent and discriminant, in order to illustrate the extent to which the observed variables were actually determining those associated latent variables that they were supposed to measure.

5.4.7.2.1 Assessment of Convergent Validly

Convergent validity can be defined as the extent to which the observed variables containing a specific scale correlate with one another. Hair et al. (2010) stated that it is very important to have high inter-correlations for all items included in each construct, which confirm that items are actually associated within the same construct to perform convergent validity. Convergent validity can be estimated by three values in SEM that are Standardised Regression Weights (SRW), Composite Reliability (CR), and average variance extracted (AVE). In addition, the recommended values by Hair et al. (2010), for each one of them to report convergent validity are as follows: SRW >0.7, CR >0.7, and AVE >0.5.

In the current study, the SRW values were presented as one of AMOS output, while the other two values for the CR and AVE were calculated by Stats Tools Package in Excel. Indeed, the CR value for each construct was calculated above as shown in table (5.30) in the previous section and the following tables (5.31) and (5.32) show the results for both SRW values and AVE values for all constructs.

Table 5.31: AVE Values for Final Run	
Construct	**AVE Value**
Currency	**0.632**
Tangible	**0.794**
Compatibility	**0.734**
Empathy	**0.627**
Timeliness	**0.621**
Responsiveness	**0.606**
Assurance	**0.664**
Right Data	**0.624**
Training	**0.678**
Ease of Use	**0.691**
Academics' Performance	**0.736**

Table 5.32: SRW for Observed Variables final Run											
OV	**LV**	**SRW**	**OV**	**LV**	**SRW**	**OV**	**LV**	**SRW**	**OV**	**LV**	**SRW**
Tang1	Tang	.787	**Time2**	Time	.720	**RD2**	RD	.785	**Curr3**	Curr	.806
Tang2	Tang	.916	**Time3**	Time	.810	**RD3**	RD	.793	**Perf1**	Perf	.746
Tang3	Tang	.961	**Time4**	Time	.780	**Tr1**	Tr	.951	**Perf2**	Perf	.804
Comp1	Comp	.868	**Resp1**	Resp	.854	**Tr2**	Tr	.831	**Perf3**	Perf	.752
Comp2	Comp	.830	**Resp2**	Resp	.794	**Tr3**	Tr	.863	**Perf4**	Perf	.837
Comp4	Comp	.872	**Resp3**	Resp	.799	**EOU1**	EOU	.902	**Perf5**	Perf	.805
Emp1	Emp	.750	**Resp4**	Resp	.854	**EOU2**	EOU	.839	**Perf6**	Perf	.795
Emp2	Emp	.834	**Assu1**	Assu	.729	**EOU3**	EOU	.775	**Perf7**	Perf	.832
Emp3	Emp	.841	**Assu2**	Assu	.869	**EOU4**	EOU	.803	**Perf8**	Perf	.889
Emp4	Emp	.736	**Assu3**	Assu	.840	**Curr1**	Curr	.829	**Perf9**	Perf	.781
Time1	Time	.837	**RD1**	RD	.879	**Curr2**	Curr	.747	**Perf10**	Perf	.870

A close examination of Tables (5.30, 5.31 and 5.32) reveals that the lowest SRW was 0.720 for Time2 which is above the minimum cut-off point of 0.7, that all CR values were higher than 0.8, and the lowest AVE value was 0.606 for GVS. These results suggest a high level of convergent validity for all latent variables in the study's measurement model.

5.4.7.2.2 Discriminant Validity Assessment

According to Hair et al. (2010), discriminant validity is known as divergent validity, which can be explained by the extent to which the observed variables (scale items) supposed to measure a particular latent variable (construct) are different from other measures that are designed to measure another construct. In other words, this type of analysis is to test whether two constructs differ by measuring the internal consistency within one construct. Indeed, in order to apply the discriminant validity, it is compulsory to have two sets of measure items intended to measure two different constructs to be not related and correlated to each other (ibid). In addition, the recommended cut-off value for the discriminant validity results is that the Square root of AVE is greater than inter-construct correlations, because higher values than the cut-off point determine higher inter-construct correlations for the same construct (Ibid).

In the current study, discriminant validity of the constructs were measured by Stats Tools Package in Excel, which compares the Square AVE of each construct with inter-construct correlations for the same construct. The findings of this test shows no inter-construct correlations values exceed the Square root of AVE. Therefore, the results of the confirmed measurement model provide evidence of discriminant validity for all study constructs. The following table (5.33) illustrates the results of the discriminant validity analysis.

Table 5.33: Discriminant Validity Results

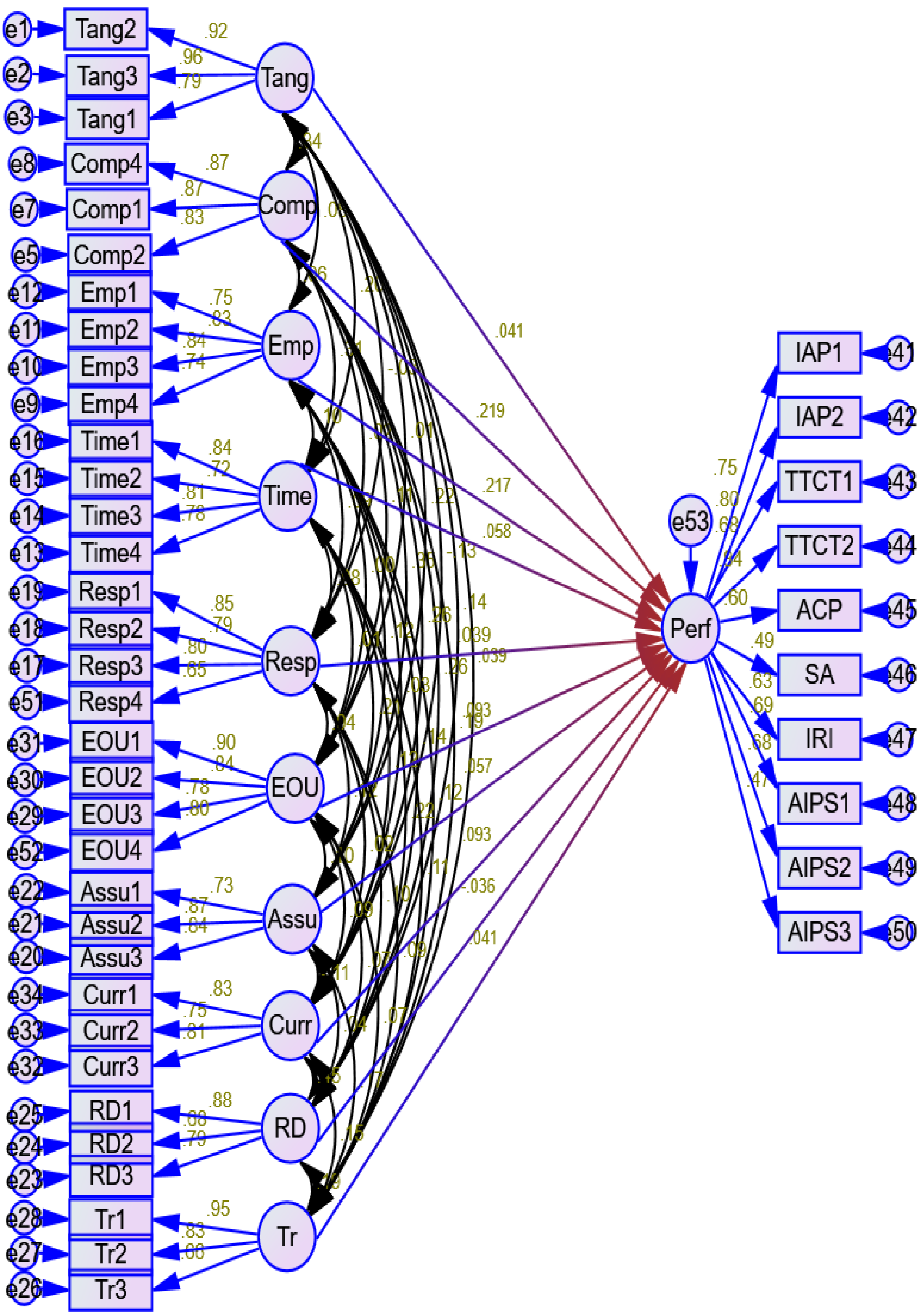
	Curr	Tang	Comp	Emp	Time	Resp	Assu	RD	Tr	EOU	Perf
Curr	**0.795**										
Tang	-0.131	**0.891**									
Comp	0.260	0.341	**0.857**								
Emp	0.028	0.076	0.058	**0.792**							
Time	0.118	0.205	0.305	0.100	**0.788**						
Resp	0.018	-0.027	0.018	0.093	0.079	**0.779**					
Assu	-0.106	0.218	0.351	0.124	0.213	0.116	**0.815**				
RD	0.446	0.136	0.265	0.140	0.221	0.101	0.045	**0.790**			
Tr	0.150	0.011	0.195	0.125	0.115	0.086	0.169	0.195	**0.824**		
EOU	0.090	0.007	0.107	0.001	0.006	0.042	0.096	0.073	0.070	**0.831**	
Perf	-0.103	0.136	0.065	0.127	0.070	0.074	0.110	0.041	0.098	-0.021	**0.858**

Based on the above Indices that have been reported for the final run in the previous section and the positive results for the measurement model assessment including construct validity, convergent validity and discriminant validity, the confirmed measurement model is ready now for the final analysis, which is performing SEM for the DV, in order to propose the final model and test the hypotheses for the current study.

5.4.8 Performing SEM

The researcher has processed a further analysis in order to test the hypothesis of the current study by making the academics' performance construct a dependent variable. After the measurement model has been confirmed, further investigation has been applied in order to use the confirmed measures to predict the dependent variable for the current study. The following figure (5.14) forecasts the dependent variable through the confirmed measurement model (the first run).

Figure 5.14: The Structural Equation Model (The First Run)



The indices of the structural equation model have shown an accepted model fit for the dependent variable compared with the entire independent variables. The following table (5.34) reports the values for the most important indices that confirmed the acceptable level for the first run of SEM.

Table 5.34: A Summary of the Reported Indices for the First Run of SEM (The First Run)				
Fit Index	**Reported Index Value**	**Recommended Criteria**	**Note**	**Reference**
Normed Chi-Square χ^2	**1.756**	Less than 3	**Accepted**	(Tabachnik and Fidell, 2007; Kline, 2011; Arbuckle, 2009)
RMR	**0.042**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
GFI	**0.905**	Higher than 0.90	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NFI	**0.907**	Higher than 0.90	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NNFI (TLI)	**0.950**	Higher than 0.95	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
CFI	**0.957**	Higher than 0.95	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
RMSEA	**0.041**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)

In addition, the following table (5.35) outlines the accepted constructs and items for the first run of SEM and the lost/removed constructs and items, determined by the SEM.

Table 5.35: A Summary of the Remaining and the Removed Constructs for SEM (The First Run)					
Construct	**No. of Items**	**Deleted Item**	**After Deletion**	**Note**	**Comment**
Ease of Use (EOU)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Responsiveness (Resp)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Training (Trai)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Assurance (Assu)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Compatibility (Comp)	3	None	N/A	**Accepted**	Three items had high loading values > 0.70.
Empathy (Empa)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70
Currency (Curr)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Tangible (Tang)	3	None	N/A	**Accepted**	Three items had high loading values > 0.70.
Right Data (RD)	3	None	N/A	**Accepted**	All three items had high loading values > 0.70
Timeliness (Time)	4	None	N/A	**Accepted**	All four items had high loading values > 0.70

In regards to the path coefficient weights, which is one of the SEM outputs, it showed significant regression among the dependent variables and the others independent variables (p-value < 0.05). However, only one independent variable was insignificantly correlated to the dependent variable (p-value > 0.05), which is the Right Data construct (RD). The following table (5.36) illustrates path coefficient weights in AMOS

Table 5.36: Path Coefficient Weights in AMOS

Code	Path	Estimate (Beta)	S.E.	C.R.	P	Comment
H1	Perf <--- EOU	.093	.022	4.298	***	Accepted
H2	Perf <--- Tr	.041	.015	2.798	**	Accepted
H3	Perf <--- Assu	.057	.015	3.833	***	Accepted
H4	Perf <--- Tang	.041	.015	2.729	**	Accepted
H5	Perf <--- Empa	.217	.020	10.627	***	Accepted
H6	Perf <--- Resp	.039	.013	3.056	**	Accepted
H7	Perf <--- Time	.058	.018	3.230	**	Accepted
H8	Perf <--- Curr	.093	.017	5.447	***	Accepted
H9	Perf <--- Comp	.219	.024	9.214	***	Accepted
H10	Perf <--- RD	-.036	.020	-1.844	.065	Rejected
Note: P < 0.001 = *** , P < 0.05 = ** and Cut off : C.R >±1.96 (Hair et al., 2010)						

Perf: Academics' Performance, **EOU**: Ease of Use, **Tr**: Training, **Assu**: Assurance, **Tang**: Tangible, **Emp**: Empathy, **Resp**: Responsiveness, **Time**: Timeliness, **Curr**: Currency, **Comp**: Compatibility, **RD**: Right Data.

5.4.9 Testing Research Hypotheses

Based on the findings of the path coefficient weights (regression weight estimates and critical ratios) in the previous section, the researcher can test the research hypotheses for the current study. Five of these paths were statistically significant at p < 0.001 as follows: Ease of Use (EOU), Assurance (Assu), Empathy (Emp), Currency (Curr), Compatibility (Comp). Another four paths were statistically significant at p < 0.05 as follows: Training (Tr), Tangible (Tang), Responsiveness (Resp) and Timeliness (Time), while only one path was statistically insignificant at p > 0.05, which is Right data (RD).

5.4.9.1 Hypothesis H1

This hypothesis tested the impact of ease of use factor on academics' performance while using ERP systems within the context of Saudi universities. The causal path between the two constructs revealed a significant positive influence at a level of p< 0.001. The null hypothesis fails to be accepted. Therefore, the alternate hypothesis is accepted (ease of use significantly impacts academics' performance), which can be explained by any increase in ease of use would significantly impact academics' performance while using ERP systems within the context of Saudi universities.

5.4.9.2 Hypothesis H2

This hypothesis tested the impact of the assurance factor on academics' performance while using ERP systems within the context of Saudi universities. The causal path between the two constructs revealed a significant positive influence at a level of $p < 0.001$. The null hypothesis fails to be accepted. Therefore, the alternate hypothesis is accepted (assurance significantly impacts academics' performance), which can be explained by any increase in assurance would significantly impact academics' performance while using ERP systems within the context of Saudi universities.

5.4.9.3 Hypothesis H3

This hypothesis tested the impact of the empathy factor on academics' performance while using ERP systems within the context of Saudi universities. The causal path between the two constructs revealed a significant positive influence at a level of $p < 0.001$. The null hypothesis fails to be accepted. Therefore, the alternate hypothesis is accepted (empathy significantly impacts academics' performance), which can be explained by any increase in empathy would significantly impact academics' performance while using ERP systems within the context of Saudi universities.

5.4.9.4 Hypothesis H4

This hypothesis tested the impact of the currency factor on academics' performance while using ERP systems within the context of Saudi universities. The causal path between the two constructs revealed a significant positive influence at a level of $p < 0.001$. The null hypothesis fails to be accepted. Therefore, the alternate hypothesis is accepted (currency significantly impacts academics' performance), which can be explained by any increase in currency would significantly impact academics' performance while using ERP systems within the context of Saudi universities.

5.4.9.5 Hypothesis H5

This hypothesis tested the impact of the compatibility factor on academics' performance while using ERP systems within the context of Saudi universities. The causal path between the two constructs revealed a significant positive influence at a level of $p < 0.001$. The null hypothesis fails to be accepted. Therefore, the alternate hypothesis is accepted (compatibility significantly impacts academics' performance), which can be explained by any increase in compatibility would significantly impact academics' performance while using ERP systems within the context of Saudi universities.

5.4.9.6 Hypothesis H6

The causal path between the training factor and academics' performance while using ERP systems within the context of Saudi universities indicated a significant positive impact of the training factor on academics' performance at a level of $p < 0.05$. This result showed no support for the null hypothesis and therefore the alternate hypothesis H6 is accepted, which suggests that training has a strong positive impact on academics' performance while using ERP systems within the context of Saudi universities.

5.4.9.7 Hypothesis H7

The causal path between the tangible factor and academics' performance while using ERP systems within the context of Saudi universities indicated a significant positive impact of the tangible factor on academics' performance at a level of $p < 0.05$. This result showed no support for the null hypothesis and therefore the alternate hypothesis H7 is accepted, which suggests that tangibility has a strong positive impact on academics' performance while using ERP systems within the context of Saudi universities.

5.4.9.8 Hypothesis H8

The causal path between the responsiveness factor and academics' performance while using ERP systems within the context of Saudi universities indicated a significant positive impact of the responsiveness factor on academics' performance at a level of $p < 0.05$. This result showed no support for the null hypothesis and therefore the alternate hypothesis H8 is accepted, which suggests that responsiveness has a strong positive impact on academics' performance while using ERP systems within the context of Saudi universities.

5.4.9.9 Hypothesis H9

The causal path between the timeliness factor and academics' performance while using ERP systems within the context of Saudi universities indicated a significant positive impact of the timeliness factor on academics' performance at a level of $p < 0.05$. This result showed no support for the null hypothesis and therefore the alternate hypothesis H9 is accepted, which suggests that timeliness has a strong positive impact on academics' performance while using ERP systems within the context of Saudi universities.

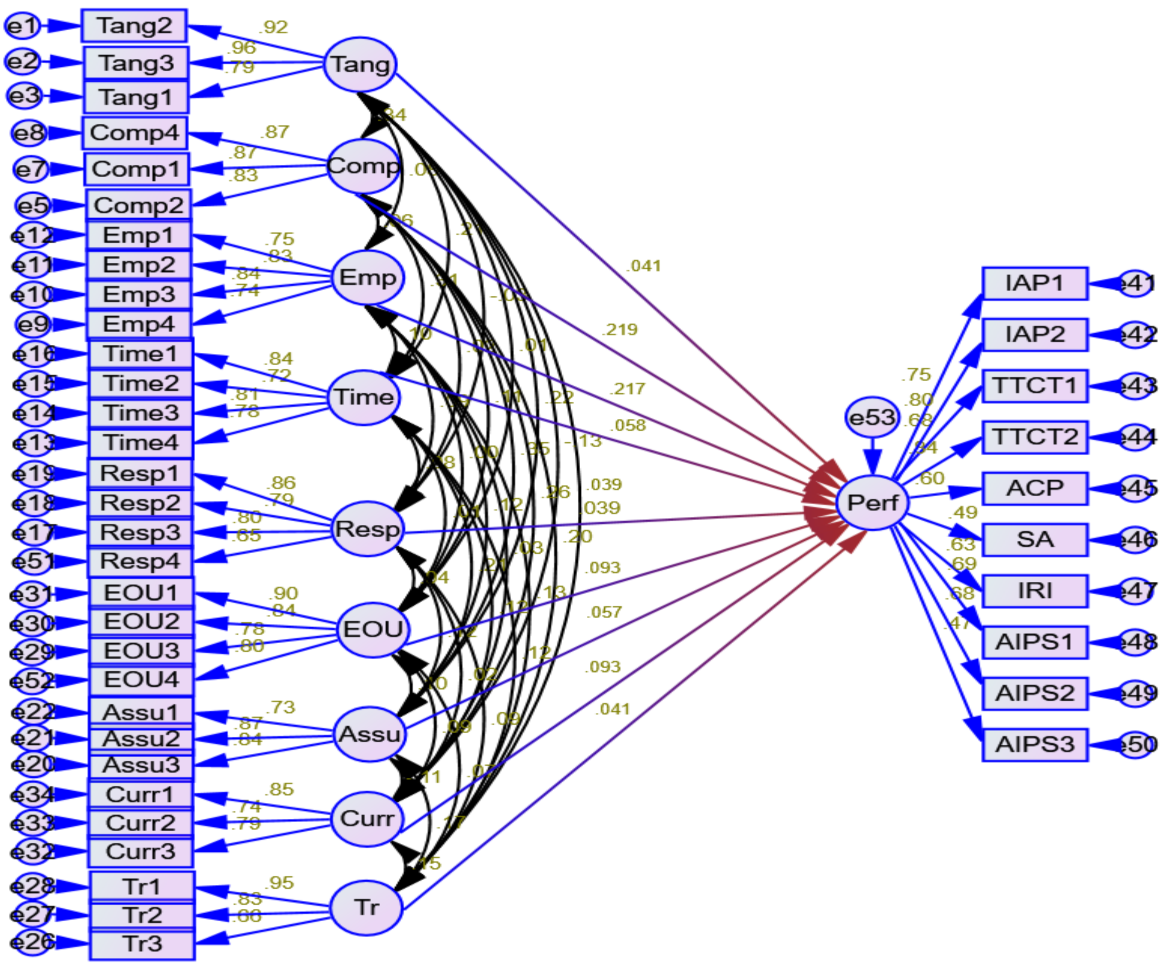
5.4.9.10 Hypothesis H10

This hypothesis tested the effect of the right data on academics' performance while using ERP systems within the context of Saudi universities. The casual relationship between the two constructs showed insignificant impact (p= 0.065 > 0.05). These results provide support for the null hypothesis, which was accepted, and therefore the alternate hypothesis H10 was rejected. This implied that right data factor does not significantly impact academics' performance.

5.4.10 The Final Research Model

In this section, the researcher excludes the insignificant regression path (right data) from the model in order to propose a model that would better fit the empirical data. The following figure (5.15) demonstrates the structural equation model (the second run).

Figure 5.15: The Structural Equation Model (The Second Run)



The indices of the structural equation model (the second run) have shown an accepted overall goodness-of-fit for the dependent variable compared with the entire independent variables. The following table (5.37) reports the values for the most important indices that confirmed the acceptable level for the second run of SEM.

Table 5.37: A Summary of the Reported Indices for the Second Run of SEM				
Fit Index	**Reported Index Value**	**Recommended Criteria**	**Note**	**Reference**
Normed Chi-Square χ^2	**1.747**	Less than 3	**Accepted**	(Tabachnik and Fidell, 2007; Kline, 2011; Arbuckle, 2009)
RMR	**0.040**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
GFI	**0.912**	Higher than 0.90	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NFI	**0.921**	Higher than 0.90	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
NNFI (TLI)	**0.981**	Higher than 0.95	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
CFI	**0.989**	Higher than 0.95	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)
RMSEA	**0.034**	Less than 0.05	**Accepted**	(Hooper et al., 2008; Hair et al., 2010; Kenny, 2011; Byrne, 2013)

In addition, the following table (5.38) outlines the accepted constructs and items for the second run of SEM and the lost/removed constructs, determined by the SEM.

Table 5.38: A Summary of the Remaining and the Removed Constructs for SEM (The Second Run)			
Construct	**Items**	**Note**	**Comment**
Ease of Use (EOU)	4	**Significant**	P-value for the construct was < 0.001
Responsiveness (Resp)	4	**Significant**	P-value for the construct was < 0. 0.05
Training (Trai)	3	**Significant**	P-value for the construct was < 0.05
Assurance (Assu)	3	**Significant**	P-value for the construct was < 0.001
Compatibility (Comp)	3	**Significant**	P-value for the construct was < 0.001
Empathy (Empa)	4	**Significant**	P-value for the construct was < 0.001
Currency (Curr)	3	**Significant**	P-value for the construct was < 0.001
Tangible (Tang)	3	**Significant**	P-value for the construct was < 0. 0.05
Right Data (RD)	3	**Insignificant /Removed**	P-value for the construct was > 0. 0.05. Therefore, the construct has been removed
Timeliness (Time)	4	**Significant**	P-value for the construct was < 0. 0.05

Finally, further assessment for the second run of SEM was performed in order to provide the Squared Multiple Correlations (SMC). SMC estimates along with total direct effects the final model variables, and is also called the coefficient of determination. SMC determines the proportion of variance in the DV that can be clarified by the IVs. In the current study the SMC was (0.742), which means that the IVs in the proposed model can explain 74.2% of the variability of the DV. Moreover, the path coefficient weights in AMOS had produced the estimated value of each IV. The estimated value for each construct can be explained by when an IV goes up by (1), the DV goes up by the estimated value of the chosen IV. In the current study, if the Emp (IV) construct goes up by (1), Perf (DV) goes up by 0.217.

5.5 Summary

This chapter has described and analysed the collected data from the quantitative method (questionnaire). Several statistical tests have been applied in order to achieve the main aim of the study, which is to investigate the ERP systems factors that highly affect the academics' performance in universities particularly in the context of Saudi Arabia. Therefore, the researcher has undertaken four steps in order to achieve accurate findings for the current study. The first step is that several tests have been applied in order to manage and prepare the collected data for further analysis. Secondly, in order to confirm that the selected sample size is representing the whole population of the current study and to highlight whether there are differences among the different groups, descriptive statistical analysis such as frequencies, independent-sample t-test and One-way ANOVA have been applied to the demographic questions. Thirdly, a more advanced analysis has been used in order to determine a confirmed structural equation model that represents the significant factors that impact academics' performance while using ERP systems in Saudi universities. Finally, the confirmed structural equation model has been practically applied to forecast academics' performance and the acceptable confirmed model obtained an explanatory percent of (74.2%). The following table (5.39) summarises the main findings of the quantitative analysis.

Table 5.39: A Summary of Findings from the Quantitative Analysis

Tests	Findings
Data Screening	The findings of the data screening tests such as missing data, outliers and normality have shown that the data for the current study is accurate and ready for further analysis.
Descriptive Analysis	Descriptive analysis has shown that the sample size has represented the whole population of the current study. In addition,

	the descriptive test has indicated that all academics groups such as professors, associate professors, and lecturers proved to have influence in the determination of factors with a significant impact upon the performance of academics whilst they use ERP systems within their universities.
Explanatory Factor Analysis (EFA)	The findings of the EFA demonstrated the final framework for the context of the current study by accepting 14 factors out of 20 factors, which had no cross-loadings or low loadings among them.
Confirmatory Factor Analysis(CFA)	The main finding of the CFA has provided a robust and stable measurement tool, which included 10 factors that would identify the significant factors that influence the academics' performance while using the ERP systems within the universities' context in Saudi Arabia.
Structural Equation Modelling (SEM)	The main finding of the SEM was proposing the final robust model, which included nine significant factors that have a direct and a significant impact on academics' performance in Saudi universities' context (Ease of Use, Training, Compatibility, Currency, Timeliness, Responsiveness, Assurance, Empathy, and Tangible).
Hypotheses	Nine null hypotheses have been rejected, as the p-value for them were < 0.05. Thus the alternative hypotheses were accepted (there is a direct and significant impact on academics' performance). On the other hand, only one null hypothesis was accepted because of the p-value for the construct was > 0.05 (Right Data construct has no direct and significant impact on academics' performance); this was deleted from the final proposed model. Please see table (5.38).

CHAPTER SIX: QUALITATIVE ANALYSIS

6.1 Introduction

This chapter aims to interpret the qualitative results from semi-structured interviews, which gauged the views and perspectives of key stakeholders involving three Saudi IT managers who have academic duties in Saudi universities, and three faculty deans at Saudi universities The rationale for adopting a qualitative research approach is closely related to the purpose of the study, the nature of the problem and the research objectives. The decision to use interview puts added value on personal language as data. Semi-structured interview is therefore consistent with the research objectives of this study. Semi-structured interviews give the researcher the chance to 'probe' for more detailed information by asking the participants to give more clarification or to elaborate further their answers.

According to Silverman (2000) and Srivastava and Thomson (2009), although the time needed to conduct interviews is more costly compared to use of questionnaires, there are several possible benefits that can be gained from interviews, such as extra explanation of the participants' views and perceptions regarding a particular issue, which can help researchers to interpret the participants' meaning more accurately. Moreover, data collection using the interview method could give more flexibility and robustness, helping to highlight the perspectives of specific people and their experiences concerning a certain issue, which could provide deeper insights for researchers into the topic under investigation (Rabionet, 2011). Semi-structured interviews can be considered as the most common type by researchers, as they allow researchers to ask participants for their opinions about particular points or details related to their research (Yin, 2013). Based on the above statements, the researcher has selected qualitative analysis for the current study and semi-structured interviews in order to test the factors in the initial framework and highlight any important explanations related to those factors. This approach based on the interviewees' experiences and knowledge is specifically aimed to support the findings from the quantitative analysis.

In the current study, a list of themes has been informed and emerged from the theoretical knowledge, literature review and the quantitative findings of the current study. This is a general list of themes with minimum guidance from the researcher in order to allow the interviewees to present their opinions fully and generously. The collected data have been collated from six semi-structured interviews with three Saudi IT managers who have academic duties in Saudi universities and three different faculty deans at Saudi universities. The current chapter is divided into eight main sections: an overview; the purpose of the chosen interview method; method design; supporting documents; data analysis process; interviewees' demographic details; theme one (system quality dimension); theme two (service quality dimension); and finally a brief summary of the chapter.

6.2 Purpose of the Interviews

One of the main reasons for a researcher to choose a qualitative study is to discover/explore a particular issue or phenomena in order to increase knowledge and awareness regarding the raised issue or phenomenon (Collis and Hussey, 2013; Sekaran and Bougie 2016; and Saunders et al., 2016). In addition, the qualitative method can be considered as an essential method in order to collect a massive amount of data, which could lead to valuable conclusions that would support and give an understanding of the quantitative findings (Leventis et al., 2005; Taylor et al., 2015). Based on the above statements, applying the semi-structured interview tool could enhance the understanding and avoid confusion regarding a particular finding raised by the quantitative analysis. That was the key purpose for conducting the qualitative method and semi-structured tool for the current investigation.

6.3 Method Design

6.3.1 Interview

According to Ragin (2013), quantitative sampling usually seeks generalisation more than discovering in-depth information about a specific issue. Thus quantitative researchers prefer to select a random sampling technique that allows the creation of a representative sample for the whole population related to a particular research. Qualitative researchers and practitioners prefer the purposive sample technique, which allows them to benefit from the experience and the knowledge of the selected sample in order to seek for in-depth details and opinions regarding the topic under study. Therefore, the current study applied the purposive sampling technique in order to select the appropriate sample who have the required knowledge and experience that could enrich the final findings of the current study. In addition, in order to maximise the accuracy of the data collection through the qualitative method, the researcher has drawn a clear design for the sample, the instrument and the administration.

Firstly, regarding the sample design, six out of the nine IT managers and the faculty deans from different Saudi universities invited to participate accepted to be interviewed. The main criteria used by the researcher to ensure that the interview participants have the required experience and knowledge are: (i) they have to be either IT managers or faculty deans who have both academic and administrative duties in their universities; (ii) they have a minimum of one year's experience using and dealing with the implemented ERP systems in their universities.

Secondly, regarding the instrument design, the researcher chose two main themes based on the initial framework and previous literature for the interviewees to discuss in order to highlight the importance of the factors that significantly impact upon academics' performance while using the ERP systems in their universities, particularly focusing on the difficulties and the future strategies. Additionally, in each interview the researcher started by introducing himself to the participant and thanking him/her for accepting to participate in the current study. Afterwards, an overview of the purpose of the current study was given. After that, each interviewee was given a consent form to be signed, which confirmed their rights such as confidentiality in dealing with their names as well as their right to withdraw their participation from the study at any time.

Thirdly, regarding the administration of the interviews, the researcher applied two methods to conduct the interviews: face-to-face and telephone calls. These took place between July 2016 and January 2017. To be more specific, four interviews were conducted face-to-face and two interviews were conducted by international phone calls. Afterwards, the researcher translated the recorded interviews and the notes taken from the conversations from Arabic into English in order to prepare them for the analysis.

Finally, the data analysis design, as discussed in the methodology chapter, was based on the thematic analysis because such a technique allows the analysis to be broadened and adds depth. Moreover, it offers flexibility, transparency and the capacity to extract the knowledge that can support the final findings of the study (Bryman and Bell, 2015).

6.3.2 Documents from Secondary Data

According to Eisenhardt et al. (2016), using multiple methods will enhance the undertaken research, making it more authoritative as well as improve the final findings. Therefore, the researcher decided to apply additional methods such as information from official documents in order to improve the reliability of the current study. Those additional documents will be analysed in this chapter along with the main source of data collection, the interviews. The following table (6.1) shows the collected documents that have been added to support the qualitative analysis.

Table 6.1: List of Supportive Documents

Doc.	Document Title	Source
1	ICT Report ICT Investments in the Kingdom of Saudi Arabia - Annual Report (2016)	http://www.citc.gov.sa/en/reportsandstudies/Reports/Documents/ICTInvestments_EN.pdf
2	Spending on ICT products and services in Saudi Arabia (2015)	www.mcit.gov.sa/En/Communication/Pages/LocalNews/TelNews-28122014_986.aspx
3	Communication and Information Technology Commission (2017)	http://www.citc.gov.sa/en/Pages/default.aspx
4	Big data technologies will play a key role in diversifying Saudi Arabia's economy away from a huge dependence on oil revenues (2017)	http://www.computerweekly.com/news/450402173/Saudi-Arabia-turns-to-big-data-to-boost-business-innovation
5	ERP systems in King Fahd University of Petroleum and Minerals Report (2016)	http://uprm.edu/cti/docs/patsi/DeploymentStudy/Introduction.pdf
6	Saudi Vision 2030 (2017)	http://vision2030.gov.sa/en

6.4 Data Analysis Process

As a starting point, the researcher coded the factors that have been highlighted in the adapted framework for the current study as the first set of codes in order to match the collected data from the conducted interviews and other documents. Therefore, if the qualitative analysis suggested adding any new factor, then it was coded as required. Researchers have the chance to select any available software packages that would help and support their qualitative data analysis such as using a specific software that helps them in the coding procedure (Saunders et al., 2016). Similarly, according to Houghton et al. (2017), by using one of the software packages such as NVivo in the qualitative data analysis, this could reduce the time taken to complete the analysis process. Another important benefit that can be gained from the available software packages is that it provides a simple access for the entered data, and these software packages are able to save huge amounts of data and arrange them to the related coding.

However, using software packages does not mean that researchers can rely just on them to do the qualitative data analysis. This is because the available software packages can be considered as tools that only aid researchers to organise the collected data and recall any important information that they require in order to help them to interpret the collected data and reflect the interpretations on the studies under investigation (Saldana, 2015). In addition, to become competent at using such software usually requires a significant amount of time and effort from researchers in order to understand how to use the software's functions (Houghton et al., 2017).

Based on the above advantages which can be gained from the available software packages and the great opportunity that research students are offered by the university by the provision of free sessions and free license to download the latest software packages, the current researcher used the NVivo software (version 11) as a help tool in order to perform the qualitative analysis. The following sections report: (i) the interviewees' demographic information, identifying themes and interrelating them; (ii) a narrative about the new findings for each theme and factor; (iii) an analytical discussion around the themes and factors and their interrelation.

6.5 Interviewees' Demographic Information

As was mentioned regarding the study sample, the interviewees were chosen carefully through the specified criteria that have been allocated by the researcher and the nature of the current study under investigation. Indeed, only six participants responded and agreed to participate. The following table (6.2) shows the demographic information related to the participants.

Table 6.2: Interviewees' Demographic Information

Interviewees	Qualification	Job Title	Experience	Academic Duties
IT Manager-A	PhD	IT Manager and Assistant Professor	2 Years	Yes
IT Manager-B	PhD	IT Manager and Assistant Professor	2.5 Years	Yes
IT Manager-C	PhD	IT Manager and Associate Professor	4 Years	Yes
Faculty Dean-A	PhD	Dean and Associate Professor	3 Years	Yes
Faculty Dean-B	PhD	Dean and Assistant Professor	1.5 Years	Yes
Faculty Dean-C	PhD	Dean and Associate Professor	3 Years	Yes

The six participants are working either as an IT manager in the deanship of Information Technology at their universities or as a faculty dean. Moreover, all of them hold a PhD qualification and their job titles are originally as academics such as assistant professor and associate professor. In addition, all the interviewees have more than one year's experience as an IT manager in a Saudi university or as a faculty dean. The following table (6.3) illustrates the interview schedules.

Table 6.3: Interview Schedules

Participant	Department	Interview Date	Interview Time	Type of Interview	Interview Location
IT Manager-A	Deanship of Information Technology	July 2016	35-40 Minutes	Face-to-Face	University
IT Manager-B	Deanship of Information Technology	August 2016	35-40 Minutes	Face-to-Face	University
IT Manager-C	Deanship of Information Technology	September 2016	45-50 Minutes	Face-to-Face	University
Faculty Dean-A	A Faculty Dean	September 2016	40-45 Minutes	Face-to-Face	University
Faculty Dean-B	A Faculty Dean	December 2016	30-35 Minutes	Telephone	International call
Faculty Dean-C	A Faculty Dean	January 2017	35-40 Minutes	Telephone	International call

6.6 System Quality Dimension

This section will highlight the viewpoint of the interviewees and information from related documents regarding the chosen factors in the adapted framework that belong to the system quality dimension. The adapted framework included fourteen factors within the system quality dimension, which could have a significant impact on academics' performance and productivity while using the implemented ERP systems in their universities. Those factors are ease of use, timeliness, compatibility, currency, training, authorisation, lack of confusion, flexibility, format, content, right data, accessibility, assistance, and accuracy. The following sub-sections will discuss the opinions of the interviewees and the collected documents in regards to the above factors.

6.6.1 Ease of Use Factor

According to the Saudi Communications and Information Technology Commission (2017), the huge investments by the Saudi government in different technologies such as ERP systems, is aimed at increasing the productivity and the efficiency of the different public sectors. However, the complex nature of ERP systems and other technologies could lead to unsuccessful implementation (Annual Report of Communication and Information Technology Commission, 2016). This is because it will be more difficult for academics to benefit from the implemented systems features and advantages. Therefore, IT Manager (B) stated that *"… Implementing new systems that provide a friendly and easy interface will yield important benefits for academics".* Moreover, the majority of the interviewees expressed similar viewpoints concerning the importance of the ease of use factor and its impact on the academics' performance by increasing their job productivity more than the legacy system in their universities. For instance, IT Manager (A) declared that *"...The implemented ERP systems were found easy to use by most of the academics because of the linkage that the new systems can provide between the new data and the stored data in the database, which can be easily recalled and used by the academics".* The Faculty Dean (C) stated that dealing with the ERP systems was found to be easier and faster than the legacy system, particularly in improving the academics' productivity and time taken to complete tasks. Likewise, the Faculty Dean (A) confirmed that "… *When I first used the ERP systems I was* afraid because if the new systems were not clear and difficult to use *that could impact and decrease my productivity and my self-confidence, which could negatively impact on my other academic colleagues in the faculty because of my position as a dean for the faculty. However, all my fears were not right because it was the opposite way".*

In contrast, the majority of the interviewed IT Managers stated that the ease of use factor was one of their main concerns. IT Manager (C) indicated that "… *One of our main aims in the IT department was to provide easy access for all the required data and functions to all academics in our university in order to attract them to use them frequently and accept the ERP systems by providing access for all academics at the same time, which would be considered as very difficult and complex in the legacy system. Moreover, it enabled all academics to fix the incorrect data easily with one click. For instance, with the new systems academics are able to change their incorrect data entry without the need to go through the old complex procedure that should be followed by academics within the legacy system of the university".*

6.6.2 Timeliness Factor

The Saudi Vision 2030 (2017b) confirmed the need to improve the effectiveness of day-to-day work in all public sectors by implementing the most up-to-date technologies as well as improving the applied technologies in order to achieve better services for citizens. Therefore, Saudi turns to big data to boost services innovation in its different departments, which will play a key role in diversifying Saudi Arabia's economy away from a huge dependence on oil revenues (Buller, 2016).

Relatively, the interviewed participants have stated the importance of the timeliness factor as one of the advantages of using ERP systems particularly for academics in their universities, which can be seen clearly through the effectiveness of the ERP systems daily output compared to the legacy system. IT Manager (B), declared that "… *The timeliness factor has been one of our essential concerns in the IT department for two main reasons. The first reason is to provide an access to the required data by academics on time and the second reason is to reduce the time taken to complete their jobs and tasks".* In addition, IT Manager (C), stated that "*… One of the important reasons for implementing such systems is to enhance the productivity of the different stakeholders in order to become one of the main competitors among the other universities".*

According to the interviewed faculty deans, ERP systems have positively impacted on the quality and speed of academics' jobs and tasks. Faculty Dean (C), declared that *"… I have many responsibilities and tasks that should be completed daily. Indeed, the implemented ERP systems have positively impacted on the accomplishment of my daily tasks. Moreover, I have noticed the positive influence of the new systems on many academic colleagues in my faculty as well. For instance, the most common mistakes and errors that were generally committed by my colleagues have been notably reduced".* In addition, according to the Faculty Dean (B), the implemented ERP systems permitted the academics to check the monthly payroll, holidays owing and other personnel information, which saves their time instead of contacting the employees' affairs department to get the personnel information required. Moreover, ERP systems allowed academics to apply for most of their special requests through the systems portal without the need to make their applications in person. Moreover, Faculty Dean (A) affirmed that *"… ERP systems remarkably improved academics' performance as it can be seen that the time taken to complete their tasks has been reduced. As an example, a task that used to take around four weeks to complete, now may take less than one week to be completed".*

6.6.3 Compatibility Factor

Most of the participants who have been interviewed were agreed that the compatibility factor is considered as an important factor in order to fit the work environment to the academics and to match the aspects of academics' jobs and tasks. IT Manager (B), stated that "… *The level of compatibility in the implemented ERP systems fits the work style in my university, where it can be seen that most of the systems' aspects matched with the needs of the academics. Moreover, most of the returned feedback from the academics proved that they are pleased with the style of the provided functions.* In addition, the annual report by King Fahd University of Petroleum and Minerals (2016), highlighted that the implemented ERP systems went through many tests to confirm their compatibility with the work style of the end users. However, the systems should be improved in order to cover more of the academics' needs, which will help them indeed to complete more tasks. Moreover, Faculty Dean (A), confirmed that "… *The new systems should be suitable and work in accordance with the academics' work environment. The implemented systems in my university are compatible with most of academics' jobs and needs. Moreover, most of the academics in my faculty agreed that the systems are suitable to accomplish many tasks".*

IT Manager (C), asserted that in order to increase the academics' productivity and performance, the implemented systems need to be regularly updated to become more compatible with the academics' duties and tasks and help them to finish their tasks effectively. Similarly, Faculty Dean (C), affirmed that "… *While, the new systems cover and match many aspects for academic users, however, I believe that the continued development of the compatibility of the systems will obviously improve the academics' performance, which would expand the capacity for the new systems to match more aspects of the academics' work and increase the suitability of the systems for the academics requirements to accomplish their jobs.*

6.6.4 Currency Factor

The currency factor is related to the availability and sufficiency of data that can be provided by the ERP systems in order to meet the requirements of the different end-users. It plays an important role in enhancing the performance and the productivity of the different users for the implemented systems (Communication and Information Technology Commission, 2015). Thus, IT Manager (A), declared that *"… The IT department recognises the importance of the currency factor, which would help* *academics accomplish their tasks and improve their performance by providing the adequate data that meet their needs. Therefore, in the IT department, one of our goals is to work very hard to provide most of the data required by academics that would help them to do their jobs and to ensure that all data provided are accurate and securely saved".*

The majority of the interviewees agreed that most of the required data are available to them. However, sometimes there is a little delay in updating some of the data. IT Manager (B), asserted that *"… Sometimes we face some technical issues in our systems that prevent us from updating some important data immediately, which may be required by academics. However, I believe that the currency factor should be considered as an important factor that will increase the productivity of academics and improve their performance by providing them with the up-to-date data that they need to accomplish their jobs and tasks".* In addition, IT Managers (C and B), stated that the IT department works very hard to provide regularly the most up-to-date information and data for the systems users. However, some delay might occur because of delays in other departments of the university, which in turn can be linked to a variety of reasons, such as the need for manual checking of some of the personal information regarding the users by a department before being recorded on the new systems.

Moreover, Faculty Dean (A), stated that "… *It is important to receive enough data that meet my needs in order to accomplish my daily tasks. I also believe that up-to-date data that can be provided by the new systems would improve my productivity and performance particularly and that of my other colleagues in the faculty. However, sometimes I have tried to look for information related to some important issue and event in the systems and no information or data were available or the data that I found were not up to date. Therefore, I believe that updating the data regularly would be more helpful for academics in order to improve their productivity and performance.* Moreover, Faculty Dean (C), confirmed that updating the state of operations and events in the systems will satisfy the purposes of academics for using the new implemented systems.

6.6.5 Training Factor

According to the annual report of the Saudi Communications and Information Technology Commission (2016b), appropriate training for employees plays an important role in the successful implementation of new systems and technologies.

Therefore, the training factor has received equal attention by the interviewees regarding its importance in improving academics' performance and productivity. In fact, all interviewees confirmed the significance of training programmes for all academics users in order to increase their knowledge and confidence regarding the new systems benefits and features that would increase their productivity and enhance their performance. IT Manager (B), stated that "… *The training factor plays an important role that commonly leads the ERP systems to success. This is because new systems demand general modifications and reengineering of the work style of the organisation. Therefore, proper training programmes are considered as an essential factor in our IT department in order to maintain the success of the ERP systems in all implementation phases".* Moreover, according to the IT Managers (C and B), professional training programmes will increase the chance for academics to understand the changes that occurred by the introduction of ERP systems into the working environment and the new mechanism's way to get their tasks and jobs accomplished. Also, training programmes could answer most questions that are raised by academic users, which will help to build positive expectations about the ability of the ERP systems. Similarly, IT Manager (A), confirmed that "… *Training programmes are essential for all academics in order for them to become more familiar with the implemented ERP systems in the university, which can improve their awareness of the advantages that the ERP systems can give to the end users".*

The importance of the training factor was evidently clear by both sets of interviewees, faculty deans and IT managers. However, some issues were highlighted by most of the interviewees that have affected the training programmes such as the timetable and the length of the training programmes. IT Manager (B), *asserted that "… Usually the IT department's team organises different training programmes during the year in order to improve the confidence and raise the level of the awareness about the ERP systems for the different end users such as academics. However, based on the initial reports that I have received before and after each training programme, the main issue highlighted is that the weak turnout of academics who register for the available training programmes".* Furthermore, according to IT Manager (A), continuous training programmes for academics are extremely useful in order to increase their understanding of the functionality of the ERP systems and the mechanisms available to complete their own tasks and jobs through the new systems.

However, it is difficult for the IT department team to measure the level of the academics' satisfaction regarding the training programmes attended, which could help the IT team to improve and develop the provided training programmes by increasing the length of the training sessions or adding extra sessions to explain specific issues related to the implemented ERP systems in the university. Likewise, IT Manager (C), confirmed that *"… It is hard for the IT team to organise training programmes schedules which are suitable for all academic staff in the university. Therefore, the IT team decided to provide different training programmes during the year in order to offer more than one option for academics to attend the most suitable time for the training programmes, which will enrich their knowledge about the implemented ERP systems, optimizing the benefits from the new systems and identifying the new services that have been added to the ERP systems".*

In addition, the interviewed faculty deans declared that training programmes can be considered as one of the most significant factors that impact upon the academics' performance and productivity. According to Faculty Dean (C), "… We *have been dealing with the legacy system for a long time. Thus, I believe that training programmes are really important for us to become more familiar with the new functionality for the ERP systems. Moreover, training programmes can offer explanations to academics about the mechanisms of the new systems, which will help them to increase their awareness and confidence while using the new systems".* However, Faculty Dean (B), affirmed that *"… The training sessions are not adequate enough for academic members to make them feel familiar with the new systems. Therefore, increasing the length of the provided training sessions and providing regular training programmes in order to present the new services and upgrades for the ERP systems will help to decrease any resistance from academics to the use of the new systems and make the ERP systems look more user friendly".* Moreover, Faculty Dean (B) asserted that some academics do not recognise the concept of the ERP systems and its features. Therefore, training programmes should become more intensive for academics and include more sessions that explain the features and the work processes for the ERP systems, which will help academics to understand the functionality of the ERP systems. However, Faculty Dean (A) stated that *"… There are some barriers affecting the registration by academics onto the training programmes, barriers that negatively impact upon their attendance at the training programmes provided by the IT department. Indeed, some academics have a very busy schedule of lecturing, academic advising for* *students, participating in local or international conferences and conducting scientific research".*

6.6.6 Other Factors in System Quality Dimension

The remaining factors of system quality dimension such as authorisation, lack of confusion, flexibility, format, content, right data, accessibility, assistance, and accuracy received less attention from the interviewees. IT Managers (A and C), stated that some factors such as authorisation, lack of confusion, flexibility, format and content were very important in the earlier phase of the new systems' implementation. Therefore, most academics considered the above less significant factors as part of the ease of use. Moreover, IT Manager (B), asserted that "… *Some factors that related to the system quality such as flexibility, format and content were highlighted as important factors in the preparation phase of the implementation in order to make the ERP systems easier and more accurate for academic users and other users than they had been in the legacy system".*

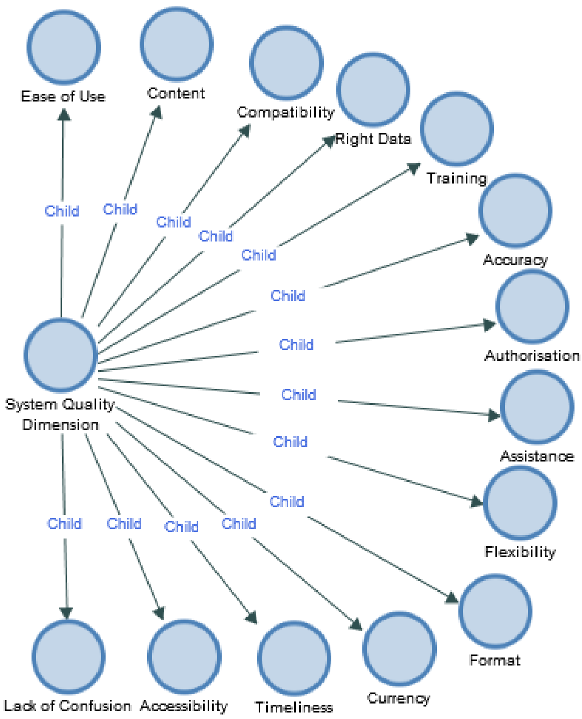
The majority of the interviewees have declared that authorisation, accessibility and flexibility issues can be considered as obstacles to implementing new systems. This is because the users sometimes cannot get the correct authorisation or access to accomplish their tasks through the new systems, which could increase the resistance to change by the employees. According to Faculty Dean (A), there is no doubt factors such as authorisation, lack of confusion, flexibility, format, content, right data, accessibility, assistance, and accuracy can be considered as important factors in the preparation phase of any new systems. However, they could have less impact on other phases of the process such as the post-implementation phase. This is because academics have been used to the legacy systems and thus compared to the new ERP systems, they found them better. In addition, IT Manager (B), stated that "… *The IT department team worked very hard in order to create clear guidelines for the data and the functions that are required by each job role in the university to link the appropriate authority's access to the relative services that would help users accomplish their tasks effectively. By applying this strategy, the university has minimised the lack of authorisation, flexibility and accessibility issues that could lead the employees to resist the change from the legacy systems to the ERP systems".*

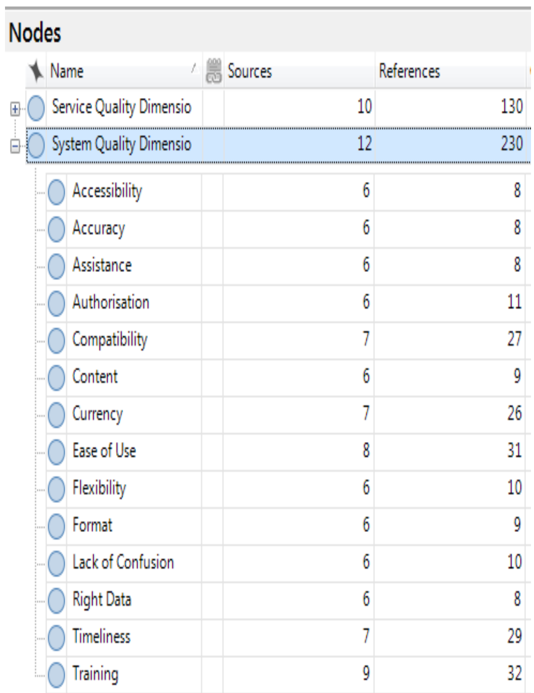
Based on the above-mentioned analysis of the interviews and supporting documents, the findings of the first theme (system quality dimension) can be summarised as follows:

- Saudi Vision 2030 is aware of the importance of increasing the performance and productivity of the public sector, particularly in the universities' context.
- Saudi Vision 2030 aims to improve factors related to the system quality dimension such as ease of use, training, data currency and timeliness in order to enhance the performance and the productivity of different employees.
- The majority of interviewees have confirmed five factors that have noticeable and significant impact on academics' performance and productivity: ease of use, timeliness, currency, compatibility and training.
- Other factors in the system quality dimension such as authorisation, flexibility, format and content can be considered as important factors in the early stage of implementation; however, if they have been applied carefully and accurately to the new systems from the beginning they could have less impact on the following stages such as the post-implementation phase.

The following figure (6.1), demonstrates the NVivo Visual Map and Tree Node for the first theme and its related factors.

Figure 6.1: NVivo Visual Map and Tree Node for System Quality Dimension





Nodes

Name	Sources	References
Service Quality Dimensio	10	130
System Quality Dimensio	12	230
Accessibility	6	8
Accuracy	6	8
Assistance	6	8
Authorisation	6	11
Compatibility	7	27
Content	6	9
Currency	7	26
Ease of Use	8	31
Flexibility	6	10
Format	6	9
Lack of Confusion	6	10
Right Data	6	8
Timeliness	7	29
Training	9	32

6.7 Service Quality Dimension

According to the annual report of the Saudi Communications and Information Technology Commission (2016b), maintaining the success of new systems and technologies requires an effective support by a technical support team in order to solve the problems that users may encounter. The majority of interviewees confirmed that service quality dimension plays an important role in order to positively impact the performance and the productivity of academic members. Therefore, neglecting the service quality factors by the IT teams in universities would cause high risk, which could lead to systems failure. In addition, most of the interviewees stated that tangible, assurance, responsiveness and empathy as service quality factors significantly influence the performance and the productivity of academic users. Moreover, the importance of providing a professional technical support team to ensure that the operations and the functions of the new systems flow smoothly, and to decrease obstacles which can negatively influence the effectiveness of the ERP systems for academic users, was widely perceived by the majority of interviewees.

According to IT managers (B and C), there is no doubt that weak service quality could negatively impact the performance of academics as well as increase the resistance to accept the new systems in organisations. Therefore, the IT teams have highlighted the service quality dimension as one of their concerns in order to increase the satisfaction levels of the different end users of the implemented ERP systems.

6.7.1 Tangible Factor

Regarding the tangibility, which can help academics to have the most up-to-date hardware and software compatible with the operations of the new systems in order for them to benefit from all the provided features, most interviewees agreed its importance in increasing the satisfaction of academic users. According to IT Manager (B), *"… By providing academics with the latest hardware and software that match with the ERP systems, that would play an important role in getting academics to accept the new systems because they will see the real difference between the legacy and the ERP systems which will increase their productivity and performance".* Moreover, IT Managers (C and B), stated that providing an attractive and friendly interface for users can be considered as a tangible service that could help academics to use the new systems regularly, which would then reduce any resistance by the academics to accepting the new systems. Therefore, tangible services are very important for academics in order to help them raise their confidence levels and increase their productivity as a result. Similarly, Faculty Dean

(C), asserted that "… *Up-to-date hardware and software will confirm the willingness of the IT department to help academic users in order to increase their performance and productivity by using the ERP systems. Moreover, I believe that a visually appealing interface would encourage academics to use the new systems regularly without any resentment".*

According to IT Managers (A and C), in order to satisfy the demand for hardware and software for each faculty and department in the university, the IT team could send out a requisition form for the hardware and software required by academics in the coming year. This would help the IT team to prepare the order from the official supplier to provide a tangible service, needed and expected by academic users. However, sometimes the supplier is late in dispatching some of the orders placed by the university. Faculty Dean (B) declared that *"… The IT department is providing the most up to date hardware and software to the academic members in the faculty in order to help them using the ERP systems easily, so they can accomplish their tasks and increase their productivity and performance in their jobs. However, sometimes some delays occur in the delivery time for the required hardware and software from the IT department in the university, which causes some resentment from my academic colleagues and makes them feel dissatisfied about working with the new systems".*

6.7.2 Responsiveness Factor

The responsiveness factor was found to be a major concern by the majority of interviewees. This is because of its significant impact on simplifying the functionality of the new systems and enhancing the academics' performance. Therefore, the interviewed IT managers (A and B) declared that responsiveness plays an important role in ensuring all the ERP systems operations and functions are working smoothly. According to IT Manager (C), "… *Creating a technical support team in order to help the academics with any technical question will add a big value to the new systems as well as increase the confidence of the academic members while using the ERP systems. Thus, my colleagues and I have created a professional and highly skilled technical team who can answer the questions raised by the end users regarding any technical problem that has occurred and needs to be solved in the systems".*

In addition, IT Managers (C and B), stated that providing a technical team to support and answer the end users' enquiries is essential for any new systems to maintain their success. Moreover, the team of the IT department believes that the technical support team must demonstrate their interest and willingness to solve the technical problems or answer general enquiries for the end users. Therefore, the technical support team in the university is subject to special training in how to communicate with users in order to solve their technical problems, which will increase the trust between the academics and the technical support team, a result that would positively impact on the productivity and the performance of academic users. However, IT Manager (C), acknowledged that sometimes the IT department receives some complaints about delays in response from the technical support team, which is due to the number of daily enquiries by the different end users in the university. Thus, the IT department is planning to increase the number of staff in the technical support team in the near future in order to reduce the response delay.

The interviewed faculty deans asserted the importance of responsiveness as one of the service quality factors provided by the IT department and its direct influence on increasing the academics' performance and productivity. According to Faculty Dean (C), "… *The technical support team will help academics to save their time in order to solve a specific technical problem that could occur in the systems. Moreover, the technical support team can play an important role in academics' resistance to the systems by demonstrating their willingness to help academics to fix any problem or enquiry related to the implemented systems.*

However, some complaints have been made to faculties' deans by academic user that related to delays in response by the technical support team when called on to fix some errors in the systems. According to Faculty Dean (A), *"… Some academics in the faculty have complained about the delay response and I believe that could negatively impact on their productivity and performance while using the ERP systems to accomplish their tasks and jobs".* Additionally, Faculty Dean (B), stated that sometimes the technical support team does not tell academic users when exactly the technical problem will be fixed and when the provided services would be performed again, which possibly could reduce the credibility of the technical support team to fix the error that occurred for academic users.

6.7.3 Assurance Factor

The assurance factor was highlighted by most of the interviewees as a major concern, which can play a key role in building trust between academic users and the technical support team. According to IT Manager (B), enhancing the level of trust between academic users and the technical team by increasing the level of the security correspondence and transactions will definitely promote the level of satisfaction for academic users. As a result, the positive relationship and the high trust between the technical support team and the academic users will lead to an improvement in the performance and the productivity for academics while using the ERP systems. Moreover, IT Manager (A) affirmed that *"… The IT department provides continuous training for the technical support team in order to increase their knowledge about the implemented ERP systems and develop their ability to solve the technical problem that could occur in the new systems. Moreover, as an IT manager, I believe that by improving the knowledge of the technical support team that would increase their confidence, which will motivate them to reduce the time taken to fix the technical problems and do their job effectively".*

However, Faculty Dean (C) stated that if academics felt that their personal information and correspondence with the technical support team were not safe and secure, this would negatively affect the degree of their trust for the technical support team and the new systems as well. Therefore, a high level of security for personal information and correspondence between the academic users and the technical support team is an important requirement in order to increase the performance and the productivity of academics while using the implemented ERP systems. Moreover, Faculty Dean (A) affirmed that "… *The keeping of academics' correspondence and their private information highly secure by the technical support team and being consistently courteous when dealing with academic users will significantly impact upon academics' performance, which can happen by creating a good relationship of trust between the technical support team of the new systems and the academic users".*

6.7.4 Empathy Factor

The empathy factor was found to be one of the main concerns for academic users while using the ERP systems. This is because the majority of interviewees stated that the emotional and psychological side of the academics, in terms of dealing with the technical support team and the services that are provided by the new systems, have a significant impact on academics' performance and productivity. According to IT Manager (B), "… *The emotional side plays an important role in the Saudi Arabian environment. Therefore, the IT department has considered the empathy factor as one of the key service quality factors that would reduce the resistance by academics and would improve their performance while using the implemented ERP systems".*

In addition, IT Manager (C) declared that based on the importance of the emotional side that can be provided by the new systems, the IT department has provided convenient operational hours for the new systems, in order to allow academics to use the ERP systems any time during the day. Moreover, academic users are allowed to access the ERP systems from the internal network at the university or an external network. Similarly, IT Manager (A), asserted that *"… Providing convenient operational hours and individual attention such as the possibility of preparing a specific greeting when accessing the new systems by the academic users would increase their satisfaction and they will feel that the new systems place the interests of academic users as one of its main priorities, which will positively affect their performance and productivity while using the implemented systems".*

Most of the interviewed faculty deans have agreed that the empathy side is an important factor that significantly impacts on the academics' performance as well as improving academics' productivity. However, some of them stated that IT departments should pay more attention to develop the service that could increase the emotional side for academic users while using the ERP systems. According to Faculty Dean (B), *"… Training the technical support team in order to increase their knowledge and increasing their awareness of the possible enquiries by the academic users will enhance the ability of the technical support team to understand the specific needs of academics, which will leave a good impression and positively impact upon the psychological side of academics that could increase their productivity and performance while using the ERP systems".*

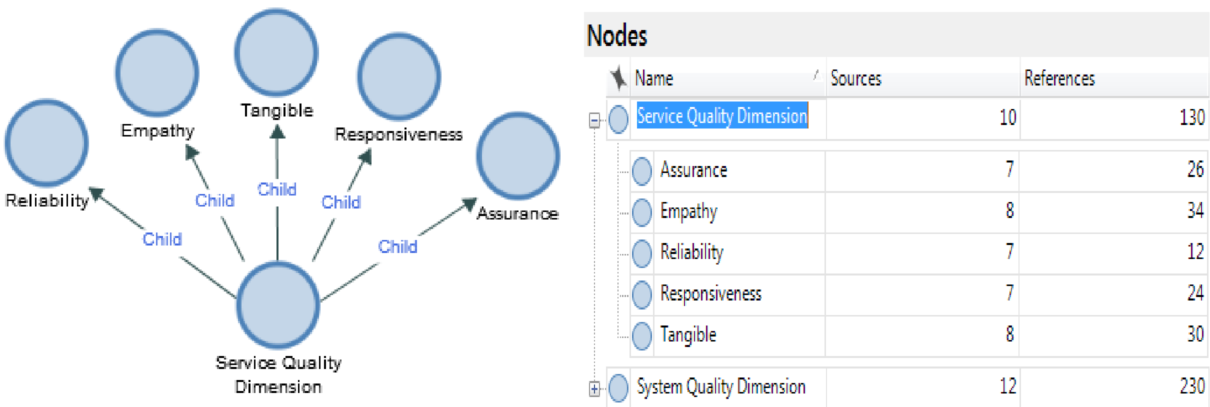
6.7.5 Reliability Factor

The reliability factor from the service quality dimension has received less attention from the interviewees. The majority of interviewees explained the lack of some important services that related to the reliability factor in the ERP systems, which could have negatively impacted upon the academics' performance and productivity. According to IT Manager (B), *"… In order to maintain the success of the new systems implementation, continuous development is required to improve the services and the functions that are currently provided. Also, it requires new services that would increase the level of satisfaction for academic users in order to improve their performance and productivity".*

However, according to the interviewed faculty deans, some important services that are related to the reliability factor are missing in the new systems such as increased credibility regarding the implementation of new services that could be provided by the ERP systems. Faculty Dean (C) stated that "… The *credibility to provide the promised new services by the new systems at the specified time is an important requirement for academic users, which could build strong trust by the academics of the ERP systems. Moreover, the showing of sincere attention by the technical support team in solving the academics' problems is another important thing that could reflect the reliability of the new systems and the technical support team for the systems".*

Based on the aforementioned analysis of the interviews and supporting documents, the findings of the second theme (service quality dimension) can be summarised as follows: (i) the Vision 2030 of Saudi Arabia has a concern to improve factors related to the service quality dimension such as tangibility in order to enhance the performance and the productivity for the different employees; (ii) the majority of interviewees have confirmed four factors that have a noticeable and significant impact on academics' performance and productivity. These are tangible, responsiveness, assurance and empathy; (iii) reliability factors in the service quality dimension were given less attention by the interviewees, which could suggest weak services related to the reliability factor in the ERP systems that needs to be improved. The following figure (6.2), demonstrates the NVivo Visual Map and Tree Node for the second theme and its related factors.

Figure 6.2: NVivo Visual Map and Tree Node for Service Quality Dimension



6.8 Summary

The current chapter has presented a summary of the qualitative analysis as a second phase for data collection for the current study. While, nine participants were invited to represent the academic users of ERP systems for the universities context in Saudi Arabia, however, only six participants accepted the participation. The other three were not able to accept the invitation because of their own private reasons or because of the busy schedule in the period of time that the interviews were scheduled. In addition, the six participants were either faculty deans or IT managers who have more than one year's experience using the implemented ERP systems in their universities as well as having academic duties along with their administrative duties. While, the number of participants in the interview phase was less than the number originally preferred in order to represent more universities in Saudi Arabia, however, the conducted interviews were satisfactory and yielded adequate data. This is because the main aim of the second phase of data collection was to explain and give a better understanding about the initial framework of the current study as well as confirming the findings that have been highlighted in the first phase of data collection, which is the quantitative phase.

It can be seen that the majority of the interviewees have confirmed the findings of the quantitative analysis regarding the two dimensions of system quality and service quality and their significant impact on academics' performance and productivity while using the implemented ERP systems in their universities. In addition, they have expressed several important explanations for the significant factors that impact on academics' performance and productivity, which provide a deeper insight from the perspective of academic users regarding the main findings of the current study, highlighted by the quantitative analysis. The following table (6.4) summaries the main findings of the qualitative analysis.

Table 6.4: A Summary of Findings from the Qualitative Analysis

System Quality Factors	Summary of the Interviewees' Perceptions
Currency	The data required ought to be readily available and sufficient for meeting potential user requirements; The data provided ought to be adequate for helping academic users be effective in accomplishing tasks; All of the data that the ERP systems provide ought to have accuracy and be saved securely.
Ease of use	The systems ought to be easy to use, reliable, have minimal errors and be accompanied with clear instructions; The complexities of systems of ERP and associated technologies could result in implementation being unsuccessful, so procedures should be easy to follow and remember, resulting in lower levels of mental stress; The provision of an easy and user-friendly interface yields significant benefits for academics so that their productivity can be increased; Potential users need the provision of easy access to all the functions and data required.

Training	Becoming familiar with services enables awareness of their capabilities and helps enhancement of self-confidence in their use. Training sessions for users help in the facilitation of better initial use, minimisation of related uncertainties and establishment of future practice that is effective. Provision of adequate knowledge with regard to the implemented ERP systems leads to increased confidence of potential users so that tasks can be run and accomplished through such systems.
Timeliness	The necessary information that the users require ought to be provided on time. Presentation of regular activities such as the printing of reports and timetables ought to be done from systems without delay. Information is updated on systems regularly and in a timely manner so that the performance and productivity of potential users can be enhanced.
Compatibility	The services ought to be convenient and flexible so that they can be used anywhere and at any time. Systems ought to be able to perform several operations simultaneously and independently. ERP systems ought to operate and fit within the environment and the style of the potential users. ERP systems ought to be provided that are compatible with the particular aspect of the duties and tasks of the academic users.
Tangibility	The most up-to-date software and hardware ought to be provided that matches the functions of the systems for potential users so that there is maximisation of the potential benefits accrued from them. Improvement to the ERP system interface, such that it is visually appealing to users, will help in the simplification and facilitation of the working of the system for the users. Simplification of the structure of the systems of ERP and their navigation functions help to make the systems more user-friendly for potential users.
Responsiveness	The technical support teams for ERP systems ought to provide services to users promptly. The team of technical support ought to be actively engaged with a willingness to help potential users. Notification of when services will be fixed or new services performed should be provided.
Assurance	The correspondence and transactions between the potential users and the technical support teams ought to be secure and safe. The team of technical support ought to be constantly courteous to the users when dealing with their requests. The knowledge levels of the team of technical support ought to be enhanced so that work is done effectively.
Empathy	The hours of operation ought to be convenient for potential users. The team of technical support ought to have an understanding of the particular needs of academic users so that requests can be dealt with in a way that helps the users feel like the work is being conducted in their best interests. Systems of ERP ought to pay particular attention to potential users through, for instance, the setting of a background that is personalised or the provision of a special greeting.

The following chapter presents a comprehensive discussion on the analysis of the results and findings that have been presented in the previous chapters and the current chapter in order to obtain triangulation among the quantitative methods, the qualitative analysis and previous research studied in the literature review.

CHAPTER SEVEN: DISCUSSION

7.1 Introduction

The aim of the current chapter is to interpret the findings of the quantitative analysis and the qualitative analysis of the factors that impact academics' performance while using ERP systems in the context of Saudi universities with reference to the objectives of the current study and the related previous studies in the literature. As has been mentioned earlier, the investigated factors have been adapted from the proposed framework of Althonayan and Papazafeiropoulou (2013), who integrated three widely used models in the field of information systems and ERP systems. This is in order to help investigate and highlight the factors that significantly impact the performance of the different end-users while using the implemented ERP systems in their context.

The current study has collected 457 questionnaires that have been distributed to different groups of academies (professors, associate professors, assistant professors, lecturers and teaching assistants). Moreover, six individuals from the same groups have been interviewed and several public documents have been collected to confirm or gain a deeper explanation of the factors from the initial framework for the current study in order to enhance the final findings of the current investigation. The structure of this chapter can be divided into four main sections: the performance impact, the system quality dimension and service quality dimension, and finally the new proposed model. Each section is supported by the results of the two applied methods (quantitative and qualitative) and the related references to the previous literature.

7.2 Respondents' Characteristics for the Questionnaires

This section discusses the responses regarding the first part of the questionnaire, which is related to the respondents' demographic/characteristics. The first part of the questionnaire has two important aims. The first aim is to confirm the number of representatives, the sample size. As explained in the methodology chapter and the quantitative analysis chapter, stratified random sampling was applied, which depended on question number three, relating to the positions of the different groups of academics (job titles). By confirming that the total number of questionnaires that have been collected from each factored group of academics reflects the percentage of the total number of academics in the Saudi universities, this ensures the representativeness of the sample. The frequencies from the different academics factored were as follows: the majority of participants were from the teaching assistant group (30%) while the second highest number of participants was split between the assistant professor group (27.4%) and lecturers group (28.4%). The last two participant groups (professors and associate professors) formed just (14%). The above findings reflected the reality on the ground of the number of academics with these job titles and positions in Saudi universities: professors (6.44%), associate professors (12.45%), assistant professors (30.06%), lecturers (15.25%), and teaching assistants (35.80%) (Ministry of Education Saudi Arabia, 2016).

In addition, the researcher compared the results of the other demographic questions such as the gender and the level of qualifications with the total percentages of the official published statistics by the Supreme Higher Education Board, in order to support the conclusion of representativeness of the current sample size regarding the total population for the current study. For instance, the first demographic question was about the gender of the academics, which divided the participants into two groups, male and female. The results of the first question have shown that (63.5%) of the overall sample were male while (36.5%) were female. This reflects the actual percentage of the academic population in Saudi universities, which is (69.6%) male and (30.4%) female (Ibid). See Table (5.9) in the quantitative analysis chapter to review the results relating to the first aim of the demographic findings.

The second aim of the descriptive analysis was to apply two main tests in order to highlight whether there are any differences between the different groups' behaviours and answers regarding the dependent variable, which in this case is the academics' performance. The quantitative analysis has shown that there are some differences with some groups, which are as follows:

By running the independent sample test on question one (gender), the finding has shown that the null hypothesis is accepted (there is no differences between the two groups' answers (male and female) regarding the dependent variable. This is because the p-value > 0.05. Similarly, questions number seven (administrative duties) (Yes or No answers) the quantitative findings outlined a p-value > 0.05, which means that the null hypothesis is accepted too (there is no differences between the two groups).

By applying the one-way ANOVA test for the rest of the questions which have more than two groups, the findings highlighted several differences in means among the different groups' answers regarding questions two (level of education), three (job title), four (year of work experience) and six (systems usages) where p-value < 0.05, which means that the alternative hypothesis is accepted (there is at least one difference between factored means). In each case, the null hypothesis failed to be accepted a further post hoc test was applied in order to highlight where the exact differences appeared among the different factored groups.

The second question has shown differences in the different factored means regarding the academics' qualifications: the mean of academics with a PhD qualification was (2.11), academics with a Masters (2.31) and finally academics with a Bachelor qualification (1.90). While, there is little difference among the answers of the three grouped means, however, the means have confirmed that most of the participants' answers tended between the agreement side and the midpoint, which is (3).

The differences among the factored means in the third question appeared between (assistant professors and lecturers) and (teaching assistant and lecturers). The mean of teaching assistants was (1.93), lecturers was (2.40), and assistant professors was (2.10). The means for the factored groups regarding the third question highlighted that most of the participants in the different job title factored group ranged between the agreement side and the midpoint.

The differences among the factored means in the fourth question appeared between (less than 2 years and 20 years or more) and (5-10 years and 20 years or more). The means differences among the factored groups can be considered as minor with an average mean of (2.13), which can illustrate that the majority answers of the participants were on the agreement side and below the midpoint of (3).

The differences among the grouped means in the sixth question regarding the usage of the systems in the university appeared between the daily use factored group and the other factored means. The mean for the group who use the systems daily was (2.04), the weekly use group was (2.21), the monthly use was (2.35), and annual use group was (2.41), and finally those who use them only when needed was (2.67).

However, the findings of the fifth question, related to the years of experience using the ERP systems at the university, has shown p-value > 0.05, which means that the null hypothesis for the fifth question is accepted (there is no differences among the different grouped by the demographics). Moreover, most of the participant groups in that question tended to the agreement scale with an average mean of (2.13) and below the midpoint of (3).

Several researchers and scholars in the literature have confirmed the above findings of the respondents' characteristics. The study of Somers et al. (2003) investigated the end-user computing satisfaction within the ERP systems domain. The summary of the collected respondents characteristics for the above study were that the gender ratio is 0.91:1 (male versus female), which means that almost half of the participants are males and the other half are female. Moreover, they found that (92%) of the participants possessed a Bachelor's or Master's degree and (3%) had a PhD qualification, and indicated that the level of education increased the awareness and tendency to expect ERP systems. In addition, their results have confirmed that the mean for the participants' years of experience of using ERP systems and years of work experience tended to the agreement side with no significant differences regarding the end-user computing satisfaction within the ERP systems domain.

In addition, the study by Chang et al. (2008) collected 240 questionnaires out of 600 distributed questionnaires in order to understand the ERP system implementation from the end user's perspective. The respondents' characteristics analysis showed (55%) female and (45%) male. Most of the participants had five years' experience in their work with a mean tended to the agreement side. Over (65%) of the participants had a Bachelor's degree and higher qualifications; moreover, they used the ERP systems on a daily basis. Therefore, the study concluded that the level of education and the regularity of using the ERP systems reflected the positive correlation among the participants' characteristics and the level of satisfaction and acceptance of the adoption of ERP systems, which is similar to the statistical demographic findings of the current study. Moreover, the study of Longinidis and Gotzamani (2009) analysed a Greek industrial giant in order to raise the important issue of ERP systems user satisfaction. The results have shown that (80%) of the participants were in the range of 31 to 50 years old and the users' gender has not shown any differences in their answers, because (90%) of the participants had IT experience before even the implementation of the ERP systems. However, the majority of the participants had non-university qualifications while the minority held a university degree. Similarly, the study by Ifinedo and Nahar (2007) evaluated the ERP systems' success in two organisational stakeholder groups. Their findings have shown that the gender and the age characteristics made no differences in terms of evaluating the ERP systems' success (Ifineo and Nahar, 2006a; Ifineo and Nahar, 2006b).

There are other studies, which have stated that there is no significant differences among the different groups of users' positions in term of user satisfaction and usefulness (Igbaria and Tan, 1997). According to Zviran et al. (2005), different educational qualifications make no significant differences regarding the user satisfaction and usefulness. However, Igbaria (1992) stated that users with higher qualifications tended to use computers more often, thus, they would rate them higher for satisfaction and usefulness. In addition, the gender and the level of systems' experience have both shown no significant differences. Holsapple et al. (2005) have confirmed the results of the study by Zviran et al. (2005), which stated that the different characteristics of ERP systems users have a particularly significant impact on ERP systems' success. This is because of their important central role in the implementation phase of ERP systems. In their study, three main characteristics have been investigated: age, level of education and years of experience using information systems. Regarding age, older users are more likely to fear new technologies and be less willing to change, while on the other hand, younger users are often more familiar with information systems. Thus, there is the likelihood of being more easily satisfied by the implemented ERP systems or other new technologies (Wierenga and Ophuis, 1997; Huang and Palvia, 2001; Aladwani and Palvia, 2001; Palvia and Palvia, 2002).

Similarly, several studies have indicated that the more experience of using ERP systems positively impacts on user satisfaction; this will lead to a higher performance and acceptance (Harrison and Rainer, 1996; Wierenga and Ophuis, 1997). Moreover, the one-way ANOVA test has shown no significant differences regarding the years of experience using ERP systems and the ERP systems' success and satisfaction in the above studies. However, Holsapple, et al. (2005) reported that job role and level of education characteristics might result in significant differences regarding user satisfaction and usefulness. Their study has indicated that those with a higher qualification tended to use new technologies more regularly than users with lower educational qualifications. The following section will discuss the factors that significantly impacted academics' performance in the current study.

7.3 The Impact on Academics' Performance (The Dependent Variable)

The widely cited DeLone and McLean's (1992) Information Systems success model has been derived from two published studies by Shannon and Weaver (1949) and

Mason (1978) (cited in Ballantine et al., 1996). Additionally, DeLone and McLean (1992) have based their proposed model in relation to a wide range of previous publications between the period 1981 and 1987. According to DeLone and McLean (1992), the main goal of the proposed model is to develop a broad information systems instrument regarding a particular context. However, other scholars have attempted to apply DeLone and McLean's (1992) model for other academic purposes. Gable et al. (2008) have attempted to highlight the relevant factors that are linked to the success of Information Systems. Six dimensions have been highlighted in the literature regarding the success of Information Systems based on previous studies. These six dimensions are systems quality, information quality, use, user satisfaction, individual impact and organisational impact. Moreover, it supports researchers in addressing the related stakeholders and their individual impact on the procedure of assessment (Chang et al., 2005).

Therefore, Seddon (1997, p. 243) focused in his study on the individual impact, which can be defined as "*the effect of information on the behaviour of the recipient of all the measures of Information Systems success.*" Another definition for the individual impact has been mentioned in the study by Gable et al. (2008, p. 389) as the "*measure of the extent to which the Information Systems has influenced the capabilities and effectiveness, on behalf of the organization of key users*". DeLone and McLean (1992) have highlighted several points that could explain the significance of the individual impact: (1) the term 'impact' is strongly related to the term 'performance': (2) the term 'impact' works for Information Systems to signal the level of user understanding, particularly of decision context: (3) the term 'impact' could signal the users' decision-making improvement and efficiency: (4) the term 'impact' could signal a change in the user's action, or decision maker's view, of the importance or usefulness of the Information Systems. Furthermore, Seddon (1997) assumed that usefulness is the level to which a person believes that job performance can be improved by using specific systems.

The current study has investigated the factors that have a direct and significant impact on academics' performance in the post-implementation phase of ERP systems in the context of Saudi public universities. These factors have been drawn from two important dimensions, which are system quality and service quality.

7.4 System Quality Dimension

Several studies in the literature have highlighted the impact of the implementation of new systems from different viewpoints, such as technical performance, user satisfaction, perceived usefulness and organisational performance. Nevertheless, there is a lack of research regarding the impact of ERP systems post-implementation on the different users' performance, particularly on academics' performance in the context of universities (Mehlinger, 2006; Wagner and Antonucci, 2009; Nazemi et al., 2012; Dwivedi et al., 2015; Sun and Mouakket, 2015). The current study has investigated this gap in the literature, based on the statement of Gable et al. (2008), who argue that in order to investigate the impact of ERP systems from any perspective, two important dimensions have to be considered. The first dimension is the impact, which can be represented by the net benefits and the second dimension is the quality, which can be represented by the appropriate substitute measure of possible forthcoming impact. Similarly, the study of Althonayan and Papazafeiropoulou (2013) confirmed the above statement and they based their proposed framework on it.

It is vital for researchers to apply the most suitable method to study the system quality dimension, therefore, the researcher has chosen the proposed factors from the study of Althonayan and Papazafeiropoulou (2013) regarding the system quality and service quality factors that are most related to the universities' context, in order to investigate the ERP systems' impact on academics' performance in the context of Saudi universities. The adapted framework has integrated three widely cited models in the field of information systems and ERP systems, in order to help investigate the impact on different end users' performance while using the implemented ERP systems. The first dimension to be discussed is the system quality, which included fourteen (14) factors from two popular models (TTF and EUCS).

The quantitative results of the current study reported a p-value <0.05 for five factors from the system quality dimension, which means that the alternative hypotheses for the five factor are accepted (these factors are significantly influencing the academics' performance while using the ERP systems). These significant factors are ease of use, training, compatibility, currency and timeliness. Moreover, the qualitative findings have confirmed the importance and significance of the above factors that have been highlighted by the quantitative analysis, as they can play important roles to fulfil the Saudi Arabia 2030 Vision, which is to improve the performance and the productivity of one of the important public contexts, namely, the universities' context.

However, some findings of the current study regarding the factors of the system quality dimension were surprising and inconsistent with the findings of previous studies. Factors such as authorisation, accessibility, flexibility, accuracy and content were important in different previous studies, which have been linked to usefulness, organisational adoption and users' satisfaction (Liao and Cheung, 2002; Ahn et al., 2005; Wu and Wang, 2007; Lin, 2007; Kerimoglu et al., 2008; Sun and Mouakket, 2015). However, other researchers have pointed out that some factors, such as accuracy, can significantly impact end users' satisfaction with information through the information quality dimension only (Nelson et al., 2005; Wixom and Todd, 2005; Wu and Wang, 2007; Aggelidis and Chatzoglou, 2012).

Indeed, the quantitative analysis has excluded some of the above factors when the exploratory factor analysis was performed because the reliability values were weak and the loading values were low. Moreover, the remaining factors have been excluded in order to increase the stability of the measurement model as has been illustrated in the quantitative analysis chapter. Furthermore, the qualitative findings have shown that some factors such as lack of confusion, flexibility, format, content, right data, accessibility, assistance, and accuracy have received less attention from the interviewees in the current study context because they were successfully drawn in the earlier phase of the new systems' implementation for the current context. Therefore, most academics have considered the above insignificant factors as part of the ease of use or not important in their context.

However, there are several studies, which had similar results to the current study regarding the above insignificant factors. The study of Chien and Tsaur (2007) has referred to some factors such as flexibility and reliability as mainly technical factors, reflecting the engineering performance of the systems. In addition, previous studies in information systems and ERP systems have shown the significant and positive impact of several factors that related to the system quality dimension such as timeliness, integration and accessibility, perceived usefulness or satisfaction. Conversely, other factors have shown insignificant influence in the context of ERP such as continuance usage. The above discussion shows that each context and aspect could result in different significant factors (Goodhue and Thompson, 1995;

Goodhue et al., 2000; Dishaw et al., 2002; Klaus et al., 2003; Staples and Seddon, 2004; Yen et al., 2010; Ali and Younes, 2013; Sun and Mouakket, 2015).

The following sub-sections divide the adopted factors of system quality dimension in the current study and link them to the models from which they derive in the literature.

7.4.1 Adopted Factors from the Task-Technology Fit Model (TTF)

The TTF model has been defined by Goodhue and Thompson (1995, p. 216) as *"the degree to which a technology assists an individual in performing his or her portfolio of tasks."* Moreover, they have stated that better performance can be achieved by continuous use only when there is task-technology fit, which can be considered as one of the model's advantages. As discussed in the literature chapter, this model has engendered debate by scholars and researchers in the field of information systems and ERP systems (Dishaw and Strong, 1999; Goodhue et al., 2000; Dishaw et al., 2002; Kositanurit et al., 2006; Chang, 2008). In addition, several studies have integrated the TTF model with other models in order to increase its strength or to cover a particular context (Dishaw and Strong, 1999; Dishaw et al., 2004; Gros et al., 2005).

In the current study, the majority of factors of the system quality dimension have been adopted from the TTF model, which have been explained in the adapted framework as the most appropriate factors that could impact on academics' performance. Those factors are lack of confusion, right data, accessibility, assistance, authorisation, ease of use, flexibility, training, accuracy, compatibility and finally currency. However, the quantitative results have determined and highlighted four factors out of the 11 factors that are related to the TTF model as significant factors that impact the academics' performance while using the ERP systems in their universities. The four significant factors that have been highlighted in the quantitative findings were ease of use, training, compatibility and currency. The following sub-sections will explain individually the four significant factors from the TTF model.

7.4.1.1 Ease of Use

The quantitative findings of the current study have determined a p-value < 0.05. Therefore, the null hypothesis failed to be accepted and the alternative hypothesis is that there is a significant impact regarding the ease of use factor on academics' performance while using the ERP systems. The ease of use factor has accounted for 7.45% of the total explained variance and included four scale items primarily associated with well-organized online services, easy to understand ERP systems terms and finally easy to use ERP systems services. The reliability score among its scale items has received (0.898) and most of the participants were ranged in the agreement side and the midpoint of (3). The importance of the ease of use has gained from its impact on the productivity and the effectiveness of the academics.

Additionally, the majority of the interviewees have confirmed the essential nature of the ease of use factor by stating that in the past, before the implementation of ERP systems, the academics were facing many difficulties and conflict among the different departments in their universities in order to perform their tasks because of poor integration. The implementation of ERP systems has increased the integration and the quality of the communication among the different departments, which has led to improvements in the universities' environments and enhanced the effectiveness and productivity of the employees, especially of the academics in the universities, all of which confirms the quantitative findings regarding the ease of use factor and its significant impact on academics' performance and productivity while using the ERP systems.

Similarly, Somers et al. (2003) stated that the findings of their study have highlighted the ease of use factor as the most significant factor that influences user satisfaction. In addition, Ifinedo and Nahar (2007) stated that ease of use factor could be considered as one of the most important factors that relates to the system quality dimension. During the last three decades, there are many studies in the field of information systems and ERP systems which have confirmed the importance and the impact of ease of use factor on user satisfaction and users' culture as one of the critical success factors (Torkzadeh and Doll, 1999; Rai et al., 2002; McGill and Hobbs, 2003; Somers et al., 2003; Somers and Nelson, 2004; Wu and Wang, 2006; Agourram and Ingham, 2007; Petter and McLean, 2009; Smitha and Mentzerb, 2010). Other publications have investigated the ease of use factor and its impact on systems' acceptance such as the study of Amoako-Gyampah (2007) and the study of Bueno and Salmeron (2008). The majority of the above studies have asserted the significant impact and importance of the ease of use factor regarding the perspectives and contexts of their studies.

7.4.1.2 Training

The quantitative findings of the current study have shown the $p<0.05$, which means that the alternative hypothesis is accepted (there is a significant impact between the training factor and the dependent variable, which is the academics' performance). The training factor has accounted for 4.73% of the total explained variance and contained three scale items that identified the provided training programmes, effective training and training schedule. The reliability score for the training factor was 0.837 and most of the participants' answers were ranged on the disagreement side and the midpoint.

In addition, the qualitative analysis confirmed the vital nature of ERP systems training by stating that training programmes are important for all end-users especially academics in order to increase their productivity and efficiency. This is because they are dealing with a huge number of students every academic year. Moreover, training programmes would increase the chance for academics to understand the changes that occurred by the use of ERP systems in the working environment and the new mechanisms to get their tasks and jobs accomplished. Also, training programmes could answer most of questions that would be raised by academic users, which will help to build positive expectations about the potential of the ERP systems.

According to Lassila and Buchner (1999), selecting the most appropriate ERP systems that have the ability to integrate the current work processes and current data archives smoothly would reduce the difficulty for the end-users to work with the new systems. Moreover, that will help to decrease the budget allocated to transfer data and to avoid any interruption due to training. Umble et al. (2003) also declared that training is vital and can be considered as one of the most important critical success factor for ERP systems' implementation and post-implementation. Correspondingly, Bradley and Lee (2007) stated that training plays an important role in all the stages of ERP systems, which involve major reengineering in the organisation. The importance of training is the better understanding of the end-users on how to deal with the new systems effectively and avoid the misunderstanding and the expected errors in their operation.

Regarding the literature, there are many researchers and scholars who have highlighted the necessity of new systems training, such as Umble et al., 2003; Zhang et al., 2005; Hsu et al., 2008; Chien and Hu, 2009. In the study of Chien and Hu

(2009), they stated that training is vital for all end-users, as it will involve the interaction of many groups of users in teaching sessions that will explain how to operate the ERP systems' available functions effectively, as well as increase their understanding about the concept and the logic of the implemented ERP systems. In addition, Zhang (2005) claimed that continuous training can improve the understanding of the relative organisational functions within the organisation, which would engage each user and make them a part of it, helping to fulfil the expectations for the implemented ERP systems. Therefore, Chien and Hu (2009) stated that training has a significant impact on the success of ERP systems, making it a critical success factor for the ERP systems' implementation.

In the same way, Hus et al. (2008) declared that intensive training is essential, as it will improve the users' confidence to use the systems efficiently and deal with the complexity of ERP systems packages. To this end, Umble et al. (2003) stated that the provider vendor or the responsible team should hold training programmes earlier, even before the implementation stage, and through the other further stages such as in the post-implementation stage.

Unfortunately, because of the limitation of time and budget, some organisations decrease the training hours especially for systems that cost a huge amount of money, which leads to a lack of understanding and negative expression from the systems' users, which ultimately may result in a big loss and implementation failure. While, most of the interviewees in the current study stated that there is a generous allocated budget for the universities in Saudi Arabia, however, they have claimed that training programmes are still weak in Saudi universities. The majority of the interviewees have pointed to the lack of expertise and the difficulties in arranging suitable times for the academics because of their busy schedules as they have lectures, labs, research, and office hours and student supervision. This has resulted in weakness regarding the training of ERP systems users.

In the literature, the above finding related to the importance of training is confirmed in two parts. The first part can be seen through the relation between the human element and the importance to user satisfaction of information systems/ERP systems (Aladwani, 2003; Somers et al., 2003). The second part, is highlighted by several researchers who state that training can be considered as an essential part of the human aim (Doll et al., 2004; Calisira and Calisir, 2004; Wu and Wang, 2007). Similarly, Hus et al. (2008) stated that organisations could avoid the failure of any new system's implementation by applying the most appropriate training programmes for their employees in order to increase their knowledge, confidence and responsibility to use the new implemented systems. Moreover, Chien and Hu (2009) have added another advantage that can be provided by the training programmes, which is increasing the understanding of the workflow in the organisation. Thus, they have confirmed that continuous training is important because the new system's implementation usually changes the organisational environment.

The qualitative analysis has shown that users do not always accept continuous training because they feel frustrated about the environmental changes in their daily work processes, which poses a big challenge or failure of ERP systems training programmes. However, the quantitative results have shown that the majority of academic participants confirmed that they referred to the training, which allows them to increase their knowledge of the new systems as well as the new added functions that help them to increase their ability to complete more tasks than before. Accordingly, Chien and Hu (2009) agreed that consistent training is vital in order to guarantee that end-users can follow the new system change processes.

Top managers were found to neglect the importance of the training that is required for the new implemented ERP systems by minimising the training budget. However, Umble et al. (2003) argued that top management should spend the appropriate budget on training programmes and add the allocated cost to the final budget of the ERP systems' implementation. According to Marshall et al. (2002), training can be considered as one of the main tools that increase human performance and enhance decision-making. Therefore, intensive and continuous training programmes would help the understanding of the different ERP systems' users, which will significantly impact on their performance.

7.4.1.3 Compatibility

Compatibility can be defined as the degree to which ERP systems match with the current end user's work styles (Rogers, 1995). The compatibility factor is an important factor in the field of information systems and ERP systems, because if the implemented systems are incompatible with the culture and convention of the organisation, they could fail (Yusuf et al., 2004; Chang et al., 2008). In the current quantitative findings, compatibility has explained 8.46% of the total variance. The compatibility factor was constructed by four scale items including the work style, matching the aspects of the work and suitability for the users' needs to accomplish their tasks; additionally, it received a reliability score of 0.900 among its four items and the majority of the participants were in the agreement side. The results of the current study regarding the compatibility factor were consistent with the qualitative results and several previous studies in different contexts.

The qualitative findings have shown that the majority of the interviewees have declared and confirmed the compatibility factor as an important factor, which significantly impacts on the academics' performance while using the implemented ERP systems in their universities. This is because in order to increase the academics' productivity and performance, ERP systems need regularly to be updated to become more compatible with the academics' duties and tasks. Moreover, the systems should be adapted to become most suited to meet the needs of academics and help them to accomplish tasks effectively.

Holsapple et al. (2005) and Soh et al. (2000) indicated that procedural and data compatibility are vital to the acceptance of the system by the end users. Moreover, several studies have found that there is a positive and a significant relation between the ERP systems users' satisfaction and the compatibility factor (Schubart and Einbinder, 2000; Lowry, 2002; O'Cass and Fenech, 2003; Holsapple et al., 2005). Additionally, the study of Sun et al. (2009) stated that the importance of compatibility has been supported by DeLone and McLean's information systems success model and empirically validated by Petter and McLean (2009). Sun et al. (2009) believed that users would not realise the significant productivity or performance gains if they do not use the implemented systems adequately and appropriately.

7.4.1.4 Currency

The currency factor refers to the up-to-date information that ERP systems provide to its end-users (Nelson et al., 2005). The quantitative results of the current study have determined that the currency factor significantly impacts on the academics' performance while using the implemented ERP systems in their universities with a p-value < 0.05, in addition to ease of use, training, compatibility and timeliness from the system quality dimension. The currency factor accounted for 4.51% of the total explained variance and was included in three scale items, which explained the provided up-to-date information that satisfied the users' need and purposes. The reliability score was 0.835 and the participants' answers were between the agreement and the neutral side of the scale; however, around 50% of participants' answers were in the agreement side in the three scale items. Moreover, the results have confirmed that most academics are satisfied with the information that ERP systems provide for them by confirming that the received data from the ERP systems met their needs and expectations. Therefore, the currency factor was considered to have a significant impact on academics' performance.

Likewise, the qualitative analysis has confirmed the significance of the currency factor by stating that sufficient data that can be provided by the ERP systems in order to meet the requirements of the different end-users, would play an important role to increase the performance and the productivity of the different users for the implemented systems. Therefore, one of the concerns of IT departments is to work hard to provide most of the data required by academics that would help them to do their jobs and to ensure that all data provided are accurate and securely saved.

The above quantitative and qualitative results have been supported by the majority of the previous studies in the literature that assert the significance of the currency factor relative to the different contexts of their studies (Zigurs and Bukland1998; Strong and Volkoff, 2010; Smitha and Mentzerb, 2010). In addition, the currency factor has received a lot of attention from researchers and scholars by investigating its impact on different perspectives such as user satisfaction and technical performance, and similarly ease of use and training factors (Ahn et al., 2005; Nelson et al., 2005; Wixom and Todd, 2005; Lin, 2007). Moreover, the currency factor can be considered as an important factor because two widely applied models in the field (TTF model and D&M information systems success model) have included it (Goodhue and Thompson, 1995 and Delone and McLean, 1992).

7.4.2 Adopted Factors from End-User Computer Satisfaction Model (EUCS)

The End-user Computing Satisfaction (EUCS) model has been proposed by Doll and Torkzadeh (1988) in order to measure the direct interaction between users and systems, to enter the required information and arrange/organise the output report which can be used to help and assist the decision makers. Moreover, Doll and Torkzadeh (1988) stated that the EUCS model is important in order to investigate the actual perceptions of particular systems and their different end-users. Therefore, several studies in the literature have applied the EUCS model in order to study the direct interaction between the implemented system and its users and for other purposes such as investigating the reliability of the EUCS instrument and its relation to performance (Doll and Torkzadeh, 1991; Amoli and Farhoomand, 1996; Somers et al., 2003; Haab and Surry, 2009).

The adapted framework in the current study has highlighted three important factors that have been added to the system quality dimension, along with the TTF factors, which could impact the academics' performance. These factors are content, format and timeliness. Surprisingly, two factors, format and content, have received weak reliability results and low loading values in the exploratory factor analysis, thus they were excluded from the beginning. However, the quantitative findings of the current study have determined only one factor that significantly impacts on the academics' performance in the context of Saudi universities, which is the timeliness factor with a p-value < 0.05 that means the alternative hypothesis is accepted (timeliness factor has a significant impact on academics' performance). The previous finding is consistent with several studies in the literature such as Somers et al. (2003), who stated that the EUCS model is one of the most important instruments to indicate user satisfaction in the ERP systems domain. Moreover, the findings of their study have highlighted the timeliness factor as one of the most significant factors among the other factors that influence user satisfaction with a p-value <0.05.

7.4.2.1 Timeliness

According to Sun and Mouakket (2015), the timeliness factor can be defined as the degree to which the systems offer timely responses to requests for information or action, which has a significant impact on system satisfaction via the dimension of system quality. In the quantitative findings, timeliness is the only factor that has determined a significant impact upon academics' performance among the other factors that have been adopted from the EUCS model. Moreover, the timeliness factor has explained 7.28% of the total variance and was constructed by four scale items that identified the accurate information provided, quick output and that information is up to date. The reliability score of the four items together was 0.865 and most of the academics' answers were ranged between the agreement side of the scale and the midpoint of (3).

Correspondingly, the qualitative findings have revealed the significance of the timeliness factor by stating that to cope with the Saudi Arabia 2030 Vision, there is a need to improve the effectiveness of daily work in all of the public sectors by implementing the most up-to-date technologies as well as improving the applied technologies in order to achieve better services for citizens. Moreover, the timeliness factor can save time for academics instead of contacting the employees' affairs department to get their required personnel information. Besides, ERP systems allow academics to apply for most of their special requests through the systems portal without the need to apply in person. Therefore, the timeliness factor can be considered as one of the most significant factors that impacts on academics' performance and productivity while using ERP systems in their universities. Finally, the qualitative results have confirmed the significance of the timeliness factor on academics' performance by the fact that academics are increasingly aware of the importance of ERP systems in order to increase their efficiency and accuracy as well as the time taken to complete and perform their tasks.

Similarly, several studies have applied response time in order to represent the timeliness term, and the investigations into their different perspectives and contexts have determined a significant impact on users' satisfaction, systems satisfaction and perceived usefulness through the system quality dimension (Wixom and Todd, 2005; Nelson et al., 2005; Wu and Wang, 2007; Abugabah and Sanzogni, 2010; Aggelidis and Chatzoglou, 2012). Additionally, the main aim of the ERP systems' implementation in the different organisations can be related to the organisations' willingness to enhance the efficiency and the effectiveness for their employees and work environment, which would lead to an increase in their competitive advantage among other organisations in the same field. Therefore, the timeliness factor has shown a significant impact on academics' performance because it could identify if the information that users require is available and on time, and supports end-users to complete their tasks in less time.

Furthermore, there are several studies in the literature, which have investigated the timeliness factor and its impact on the aspects of user satisfaction, technical aspects and organisational performance. In addition, these studies have highlighted the important and significant impact regarding the above different aspects and linked their importance to the main advantages of the ERP systems' implementation that are saving time and increasing productivity (Torkzadeh and Doll, 1999; Somers et al., 2003; Somers and Nelson, 2004; Zhang et al., 2005; Wei, 2008; Abugabah and Sanzogni, 2010; Sun and Mouakket, 2015).

7.5 Service Quality Dimension

The service quality dimension can be defined as the degree of discrepancy between customers' normative expectations for service and their perceptions of service performance (Gorla et al., 2010). While Quinn et al. (2009, p. 140) defined service quality as *"the quality of the support that systems users receive from the Information*

Systems department and Information Technology support personnel." Moreover, Quinn et al. asserted that the service quality dimension has the scope to investigate the impact of the service quality of organisations by comparing the different users' expectations with users' attitudes and perceptions. Likewise, Seth et al. (2006) stated that the dimension of service quality has the capacity to determine the success or the failure for the ERP systems; thus, researchers and scholars have highlighted the potential importance of service quality and its impact on ERP systems end-users.

The vital nature of the service quality dimension has been raised by the broad debate in the literature by different scholars and researchers (Pitt et al., 1995; Sedera and Gable, 2004; Kettinger and Lee, 2005; Chien and Tsaur, 2007; Petter et al., 2008; Bernroider, 2008; Rabaa`i and Gable, 2009; Abugabah et al., 2010; Althonayan, 2013). Several researchers declared the importance of service quality to be added in the setting of information systems and ERP systems (DeLone and McLean, 2003; Kettinger and Lee, 2005). DeLone and McLean (2003) have critically reviewed the different arguments regarding the service quality dimension and its importance. Based on their critical review, they have proposed an updated model of information systems' success by adding service quality to their updated model.

The factors that have been selected, which are related to the service quality dimension from the adapted framework, are tangible, reliability, responsiveness and assurance. However, the updated information systems success model by Delone and McLean (2003) has included another important factor, which is the empathy factor. The empathy factor has been supported by many scholars and researchers in the ERP systems field as an essential factor that has to be investigated through different perspectives such as user satisfaction, usefulness and the different users' performance. Jiang et al. (2002) have found high convergent validity for the reliability, responsiveness, assurance, and empathy of the service quality model scales and found acceptable levels of reliability and discriminant validity among the reliability, responsiveness, and empathy scales. Moreover, several researchers and practitioners have stated that the empathy factor of the service quality dimension has received a highly validity and reliability as well as the other four factors (Landrum and Prybutok, 2004; Ma et al., 2005; Parasuraman et al., 2005; Landrum et al., 2007; Abugabah et al., 2009a; Abugabah et al., 2009b; Gorla et al., 2010; Tsai et al., 2011). Therefore, the current study has included the empathy factor along with the other four factors in the service quality dimension in the adapted framework.

According to Landrum et al. (2007), the results of their study have highlighted the importance of the service quality dimension that explained 50 percent of the usefulness variance; precisely four factors in service quality have shown a significant impact on usefulness, which are tangible, reliability, responsiveness and empathy, while assurance has shown insignificant impact on usefulness. Moreover, empathy and responsiveness have played an important role regarding user satisfaction, while information quality dimension was not a significant predictor of either usefulness or satisfaction. These results also showed that in both instances staff service quality was superior to service quality in predicting usefulness and satisfaction. The above results supported the final findings of the current study by confirming that service quality explained the majority of the variance regarding the academics' performance. This is because out of five factors in service quality, four factors (tangible, responsiveness, empathy, assurance) have received a p-value < 0.05, which means that the alternative hypothesis is accepted (there is a significant impact on the academics' performance), while out of 14 factors which related to the system quality dimension, only five factors were found to significantly impact on the academics' performance, where p-value < 0.05. Additionally, in relation to the context of universities, several studies have declared that their findings have shown that better service quality would increase the users' perception of usefulness, individual impact and would enhance the different users' performance that can be gained from the ERP systems (Gupta and Kohli, 2006; Guimaraes et al., 2007; Petter and McLean, 2009; Abugabah et al., 2015).

Indeed, both findings from the quantitative and the qualitative analyses have been consistent regarding the importance of the service quality dimension and its impact on the academics' performance. The results of the quantitative analysis regarding service quality have been supported and confirmed by many studies in the literature in terms of different perspectives such as user satisfaction, the value of service quality, or the perceived value of information systems (Chang et al., 2005; Ray et al., 2005; Seth et al., 2006; Petter et al., 2008). The majority of the published studies above have determined a significant correlation and impact of service quality factors on the investigated dependent variable in their contexts.

Surprisingly, the quantitative findings of the current study have determined a p-value > 0.05, in regard to the reliability factor, which means that the null hypothesis is accepted (there is no significant impact between the reliability factor and the academics' performance). Likewise, the reliability factor has received less attention in the qualitative analysis. This is because, there is an absence of some important services related to the reliability factor in the ERP systems, which could have negatively impacted on the academics' performance and productivity.

Several studies in the literature have highlighted the significance of the dependents' variables. The study of Sun and Mouakket (2015) referred to the reliability factor as the dependability of the system operation and it can be considered as key to user satisfaction in the ERP systems field (Wixom and Todd, 2005; Wu and Wang, 2007). In addition, Ma et al. (2005) defined reliability as the ability to perform the promised service dependably and accurately. Moreover, the reliability factor measures the extent to which the information systems department strives to improve the information services provided to users (Gorla et al., 2010). However, Wixom and Todd (2005) stated that the reliability of the different systems could not directly impact on their use and could only impact on the system satisfaction through the system quality dimension. Likewise, several studies stated that reliability and completeness factors could be related to the system quality and information quality dimensions. Moreover, the reliability factor could significantly impact on the perceived usefulness via the above two dimensions, while it could not be significant in the service quality dimension (Lin, 2007; Abugabah and Sanzogni,, 2010; Sun and Mouakket, 2015). Similarly, Nelson et al. (2005) and Wixom and Todd (2005) have found that reliability and completeness, as factors of information quality and system quality, have significant influence on users' satisfaction.

Therefore, the above statements could explain why the reliability factor received a weak reliability value and was insignificant in the context of the current study, while the other four factors were significant and directly impacted on the academics' performance in Saudi universities. Under the following sub-headings the four factors from the service quality dimension that had a significant impact on academics' performance regarding the current study are discussed. These are tangible, responsiveness, assurance and empathy.

7.5.1 Tangible

According to Ma et al. (2005), tangible can refer to the physical facilities, equipment and appearance of personnel. The quantitative findings of the current study have highlighted that the tangible factor accounted for the largest proportion (14.31%) of the total explained variance and was considered as the most important factor in the exploratory factor analysis. The tangible factor was identified by four scale items with a reliability score of 0.925 among them. The four items were related to tangible service and the feasible interaction provided by the universities to their academics in order for them to use the implemented ERP systems. Finally, the results have shown a p-value < 0.05, which means that the tangible factor significantly impacts academics' performance; therefore, the null hypothesis failed to be accepted. The majority of the participants were ranged between the agreement side and the midpoint (3) in the measurement scale.

Likewise, the qualitative analysis shows the importance of tangibility, as an essential key factor that can increase the satisfaction of academics and help them to have the most updated hardware and software that is compatible with the operations of the new systems, so that they benefit from all the features provided by the ERP systems. Moreover, providing an attractive and approachable interface for users can be considered as a tangible service that could encourage academics to use the new systems regularly and reduce any resistance by the academics to accepting the new systems. The significance of the tangible factor on academics' performance is consistent with several studies in the literature through different perspectives (Seth et al., 2006; Chang et al., 2005; Ray et al., 2005; Petter et al., 2008). The above studies have confirmed the importance of the tangible factor in order to increase the productivity of the end-users and the usefulness of ERP systems.

7.5.2 Responsiveness

Ma et al. (2005) defined responsiveness as the willingness to help customers and provide a prompt service. Moreover, responsiveness includes items that measure the extent to which the information systems' staff are willing to help users and provide prompt service (Gorla et al., 2010). The quantitative results of the current study have illustrated that the responsiveness factor accounted for 6.24% of the total variance explained. The responsiveness factor contained four scale items and identified prompt service to users from the technical support team, the continuous help from the technical support team to users and the availability of the technical team. The reliability score for the four items together was 0.856 and an average of approximately 65% of the participants tended to the agreement side for the four sale items. Additionally, the results determined a direct and significant impact for the responsiveness factor on the academics' performance while using the implemented ERP systems in their universities, where p-value < 0.05.

Similarly, the qualitative analysis has demonstrated the significance of the responsiveness factor on academics by stating that responsiveness plays an important role in simplifying the functionality of the new systems and enhancing the academics' performance. Moreover, providing a technical team to support and answer the end users' enquires is essential for any new system to maintain its success. Besides, the technical support team must demonstrate their interest and willingness to solve technical problems or answer a general enquiry for the end users. Therefore, the technical support teams in universities are subject to special training in how to communicate with users in order to solve their technical problems, which will increase the trust between the academics and the technical support team, and achieve results that would positively impact the productivity and the performance of academic users.

The significant impact of responsiveness on academics' performance is consistent with several studies in the literature in the information systems and ERP systems field such as the study of Ray et al. (2005), Petter et al. (2008) and Gorla et al. (2010). They have confirmed the importance of the service quality dimension and responsiveness in particular on different aspects such as user satisfaction and system satisfaction. Moreover, they have declared that a lack of responsive services could result in systems failure and increase the resistance to change by the different users.

7.5.3 Assurance

Pitt et al. (1995) defined assurance as the knowledge and courtesy of employees and their ability to inspire trust and confidence. In the current study, the quantitative findings have found the assurance factor to be one of the significant factors that impact on academics' performance while using the implemented ERP systems, where $p\text{-value} < 0.05$. Moreover, the assurance factor has accounted for 5.4% of the total explained variance and included three scale items that identified the knowledge of the support team and the safe transaction and correspondence in the ERP systems. The reliability score for the three items together was 0.852 and most of the participants were ranged between the agreement side and the midpoint of the scale.

Additionally, the qualitative analysis has illustrated the importance of the assurance factor by stating that assurance forms a key element in building trust between academics and the technical support team, which will definitely promote the level of satisfaction for academic users. As a result, the positive relationship and the high trust between the technical support team and the academic users will lead to increased performance and productivity for academics while using the ERP systems.

The quantitative and the qualitative findings regarding the assurance factor are consistent with several previous studies in the literature (Lin, 2007; Abugabah and Sanzogni, 2010; Gorla et al., 2010; Sun and Mouakket, 2015). They have stated that the assurance factor plays an important role in user satisfaction as one of the service quality variables, which could confirm the significant impact on academics' performance while using the ERP systems in their universities.

7.5.4 Empathy

Empathy can be defined as the caring and the individualised attention that ERP systems and the technical support team provide to the end-users (Pitt et al., 1995). In the current study, the quantitative analysis has highlighted empathy as a significant factor that impacts academics' performance in the context of Saudi universities, where p-value < 0.05, which means that the alternative hypothesis is accepted (empathy factor has a significant impact on academics' performance while using the implemented ERP systems). Moreover, the quantitative results have shown that the empathy factor has accounted for 6.24% of the total variance explained and contained four scale items that identified convenient operating hours, users' best interests at heart and providing individual attention. The reliability score of the four scale items was 0.863 and the highest percentage of the academics' answers were ranged between the agreement side and the midpoint of the scale.

Additionally, the qualitative analysis has demonstrated the importance of the empathy factor on academics' performance by stating that the emotional and psychological aspects in terms of dealing with the technical support team and the services provided by the new systems have a significant impact on academics' performance and productivity. This is because empathy plays an important role in Saudi culture, whether in the lifestyle or in the working environment. Therefore, the empathy factor can be considered as one of the significant factors that have an impact on academics' performance and would lead them to increase their productivity while using the ERP systems.

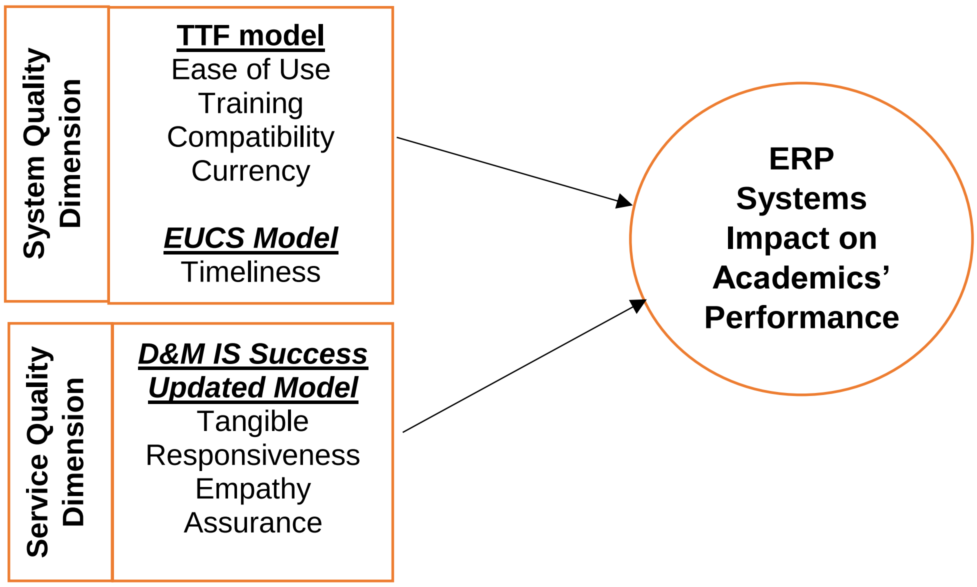
Several studies in the literature have confirmed the importance and the high reliability of the empathy factor as one of the service quality variables. Moreover, these studies have agreed about the significant impact and correlation between empathy and different aspects such as users' satisfaction, usefulness and organisational satisfaction (Landrum and Prybutok, 2004; Ma et al., 2005; Parasuraman et al., 2005; Landrum et al., 2007; Abugabah et al., 2009a; Abugabah et al., 2009b; Gorla et al., 2010; Tsai et al., 2011). The previous studies mentioned above can be considered as supportive results for the quantitative and the qualitative findings of the current study that highlighted the empathy factor as a significant factor that impacts on the academics' performance while using the ERP systems in Saudi universities.

7.6 Proposed Model

Based on the discussion of the importance of the initial framework in order to fill the gap that was highlighted in the literature review chapter, the researcher has applied the initial framework which included nineteen (19) independent factors related to two essential dimensions, "system quality" and "service quality," in order to investigate the factors that significantly impact academics' performance while using the implemented ERP systems in their universities. The current investigation has led the researcher to propose a new fit model for the context and the perspective of the current study. The quantitative and qualitative results of the current study have been discussed above and nine factors have been determined that significantly impact on the academics' performance in Saudi universities while using the ERP systems in their universities. The first five factors were related to the system quality dimension and the other four factors were related to the service quality dimension.

In addition, based on the most important indices of the structural equation modelling (AMOS), as has been demonstrated in the quantitative analysis chapter, the researcher has proposed the appropriate fit model that highlighted the most significant factors that impact on the academics' performance in Saudi universities. The following figure (7.1) demonstrates only the significant factors from the initial framework.

Figure 7.1: The Significant Factors that Impact Academics' Performance While Using ERP Systems in Saudi Universities.



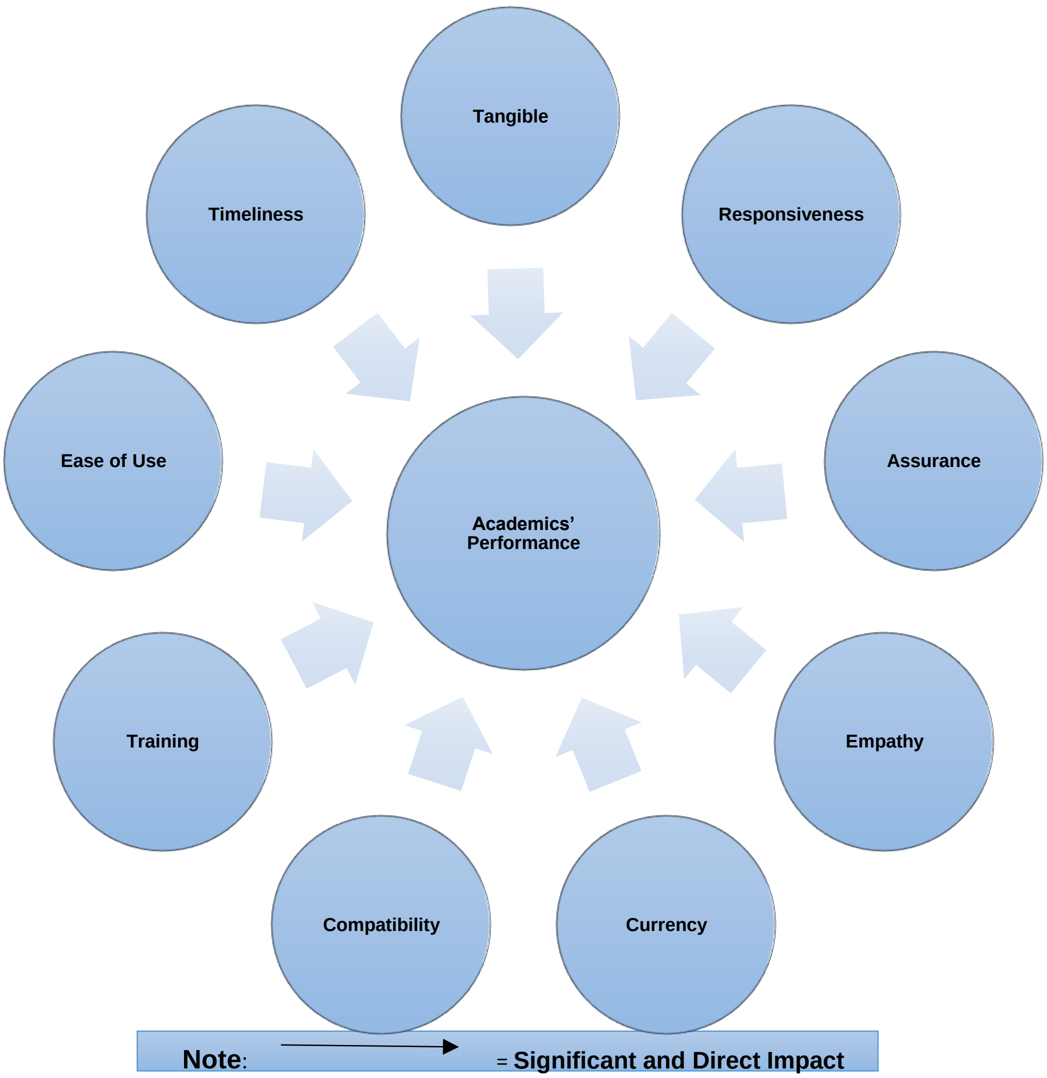
The main objective in the current study was related to the investigation of the factors that significantly impact academics' performance while using ERP systems in Saudi universities based on the system quality and service quality dimensions. Regression analysis findings from the output of the structural equation modelling highlighted the significant factors that have direct impact upon the academics' performance. The best-fit model was assessed by SEM and has portrayed nine factors that significantly impact upon the academics' performance while using the implemented ERP systems in their universities where p-value (Sig.) <0.05. This regression equation in the current study has accounted the Squared Multiple Correlations by (0.742), which means that the IVs in the model can explain 74.2% of the total variability of the DV. The proposed model includes nine independent variables, five of them determined from the system quality (compatibility, ease of use, timeliness, training and currency) and four of them determined from the service quality (tangible, empathy, responsiveness and assurance). Moreover, the compatibility factor was the most significant independent variable with the largest beta coefficient = 0.219 and the second factor was the empathy factor with a beta coefficient value = 0.217. Only one factor turned out to be insignificant in the path coefficient weights output at p-value > 0.05, which is the Right Data factor = 0.065, and thus was excluded from the final propsed model. The following table (7.1) illustrates path coefficient weights in AMOS.

Table 7.1: Path Coefficient Weights in AMOS					
Path	Estimate (Beta)	S.E.	C.R.	P	Comment
Perf <--- EOU	.093	.022	4.298	***	Accepted
Perf <--- Tr	.041	.015	2.798	**	Accepted
Perf <--- Assu	.057	.015	3.833	***	Accepted
Perf <--- Tang	.041	.015	2.729	**	Accepted
Perf <--- Empa	.217	.020	10.627	***	Accepted
Perf <--- Resp	.039	.013	3.056	**	Accepted
Perf <--- Time	.058	.018	3.230	**	Accepted
Perf <--- Curr	.093	.017	5.447	***	Accepted
Perf <--- Comp	.219	.024	9.214	***	Accepted
Perf <--- RD	-.036	.020	-1.844	.065	Rejected
Note: P < 0.001 = *** , P < 0.05 = ** and Cut off : C.R >±1.96 (Hair et al., 2010)					

Perf: Academics' Performance, **EOU**: Ease of Use, **Tr**: Training, **Assu**: Assurance, **Tang**: Tangible, **Emp**: Empathy, **Resp**: Responsiveness, **Time**: Timeliness, **Curr**: Currency, **Comp**: Compatibility, **RD**: Right Data.

To conclude, based on the above discussion regarding the above findings the following figure (7.2) illustrates the final model for the current study.

Figure 7.2: Final Proposed Model of the Current Study



7.7 Summary

The current chapter has provided a discussion of the findings obtained from both methods of the empirical study (questionnaire and interview). These results have been discussed with reference to the related literature in order to highlight whether the current findings have been supported by other researchers in the field of information systems and ERP systems or determine something unique. Overall, the final conclusion that can be drawn from the discussion is that there are nine factors that have significant impact on academics' performance in the Saudi public universities, which certainly would result in greater improvement and development on their performance. In addition, as has been discussed in this chapter, the findings are mainly consistent with the previous published studies in the literature, especially the significant factors that have been investigated regarding the two dimensions "system quality" and "service quality".

In addition, each significant factor has a direct impact on academics' performance while using ERP systems in their universities. Therefore, universities have to consider the nine significant factors, which are compatibility, ease of use, timeliness, training and currency from the system quality dimension and tangible, empathy, responsiveness and assurance from the service quality dimension in order to achieve high academic performance via the implemented ERP systems. The following chapter draws these results to a final conclusion and proposes several recommendations for the context of Saudi universities and other university contexts in different countries that have a similar environment such as the Gulf and Middle Eastern countries regarding the factors that highly impact academics' performance while using the implemented ERP systems in their universities. The following table (7.2) summaries the key findings for the current study based on the above discussion.

Table 7.2: A Summary of Key Findings Based on the Discussion Chapter	
1	These study findings are in line with several studies that related to different perspectives such as user satisfaction, usefulness and organisational performance within the broad literature in the field of information and ERP systems.
2	Findings revealed the importance of the ERP success factors within the current research study for the prediction of the productivity and performance of different stakeholders, particular academics in universities' context.
3	Results confirmed that there were nine factors that have a direct and a significant impact upon the performance of academic staff while using ERP systems within universities in Saudi Arabia (Ease of Use, Training, Compatibility, Currency, Timeliness, Responsiveness, Assurance, Empathy, and Tangible).
4	Results indicated that all academics groups proved to have influence in the determination of factors with a significant impact on the performance of academics whilst they use ERP systems within their universities.

5	Effective training increase the awareness for academics users of the capabilities for the ERP systems
6	Ease of use factor will reduce resistance to change by academic users.
7	Providing the most up to date and applicable software and hardware with the ERP systems for end user would increase their performance and productivity.
8	Findings revealed that the nine predictors of academics' performance provide 74.2% explanation of variance.
9	Empathy and Compatibility factors were received the highest path coefficient weight, which means both factors have more impact than the other seven factors on the academics' performance while using the ERP systems in their universities.
10	Interview participants held similar views regarding the importance of the factors that significantly influence the academics' performance while using ERP systems in the Saudi universities' context.
11	The unexpected and interesting findings were as follow: (1) Some of the important information that academics required are not provided by the systems on time; (2) Reliability factor was not significant in the current context; (3) Right data factor was excluded from the proposed model, as it was received insignificant regression weight; (4) The empathy factor has been neglected in the implementation of ERP systems.

CHAPTER EIGHT: CONCLUSION AND RECOMMENDATIONS

8.1 Introduction

This chapter draws conclusions and interprets the findings obtained from the quantitative questionnaires and the qualitative interview themes, in line with the research objectives with a link to the literature review. It is worth reiterating at this stage that this study aimed to determine and explore the factors that have a significant and direct impact upon the performance of academics whilst they used ERP systems that have been implemented within the context of the universities of Saudi Arabia. This chapter also highlights the contribution to knowledge and identifies the limitations of this study, and suggests areas for further research. The recommendations made regarding strategies are outlined for the universities' context so that the academic performance and productivity can be enhanced when new ERP systems are implemented or the implemented ERP systems are developed within universities in Saudi Arabia and other Middle Eastern countries.

8.2 Positioning this Study within the Key ERP Debate

The aim of this synopsis of the literature is to demonstrate whether the findings of the present study are consistent and relate to those of similar studies in the literature. It seeks to assess whether the results support or challenge existing key literature and how the findings fit in with the existing body of ERP literature and contribute to knowledge of ERP as a research area. It highlights the main themes that emerged from the research and positions this study within the broad ERP debate. It demonstrates also that the literature enabled and informed the researcher to formulate the quantitative questionnaire and the qualitative interview questions. The large body of literature clearly suggests that ERP systems are viewed as a driving force, which plays a key role in the day-to-day operations of modern business organisations. The positive impact of IT on the structure and practice of many organisations has long been acknowledged. The implementation of ERP systems has potential benefits within organisations if they are suitably and effectively adapted to enhance both performance and productivity, taking into account the organisational culture. Moreover, the necessity of implementing ERP for organisations of all types and sizes is a recurring argument that appears in the majority of previous studies, which stress that enhancing ERP leads to value creation within organisations. The literature supports the view that there is a strong positive relationship between effective ERP development, which in turn leads to productivity, and economic growth.

Organisations and institutions are undoubtedly in better shape today thanks to the huge potential benefits global networking and information technology offer, firstly by improving and often replacing traditional paperwork services and practices, particularly within public organisations, and secondly, by making a valuable contribution to organisations' operations and quality services, in turn benefitting its different stakeholders. The gist of the debate regarding the above suggests that the implementation of ERP is likely to generate a range of gains and provide perspectives that could potentially benefit organisations and lead to continuous improvement through streamlining their departments and becoming more efficient in terms of both costs and production. For instance, ERP facilitates the integration and strengthening of the different applications in the one system (total enterprise integration). It makes available the necessary information and data across the entire organisation's systems. It reinforces the relationships and co-operation of the users, partners, suppliers and customers across the different sites of the organisation, providing accurate information, quick access to information, business analysis, product development and service efficiency.

Finally, the literature of Information Systems and ERP systems has shone a light on the importance of the assessment phase throughout the different implementation phases, which allows the decision makers to evaluate the systems from different perspectives in order to enhance, develop and maximise the benefits that can be gained from such a technology. Therefore, the main concern of the current study is to focus on the evaluation phase of the implemented ERP systems from the academics' perspective in order to enhance their performance and productivity while using the ERP systems within the universities' context in Saudi Arabia.

8.3 Linking Findings to the Study Objectives

Based on previous chapters, including the results reported in Chapters 5 and 6, and the discussion in Chapter 7, this section determines the key findings of the current study by briefly demonstrating how the research results support and achieve the research objectives specified in section 1.5 in Chapter 1:

- To identify the current problems and challenges hindering the implementation of ERP within the Saudi universities' context as an example of a developing Middle Eastern country.

- To determine the factors influencing academics' performance while using ERP systems in the context of Saudi universities, as an example of a developing Middle Eastern country.
- To highlight any differences among the different groups of academics regarding their attitudes regarding their performance as a dependent variable while using ERP systems.
- To develop and test a model that portrays the critical factors which significantly affect academics' performance while using the ERP systems for the context of Saudi universities from the perspective of academics' attitudes and perceptions.

8.3.1 Research Objective 1

The first research objective had the aim of identifying the current challenges and problems that are acting to constrain and/or obstruct the effective implementation of ERP in the universities' context using the case study of the universities within Saudi Arabia as an example of a developing Middle Eastern country. From a review of the literature, it can be concluded that no consensus exists in terms of perspectives on the research into the systems of ERP; indeed, many studies have failed to provide empirical data regarding failure rates or the practical implications of the use of ERP. Research on ERP tends to be divided between those critics who consider it to be limited and without great benefit, and other critics who consider ERP to be a system that is complex and multidimensional though with the potential for successful implementation. Previous literature, then, reveals often contradictory and conflicting views regarding the most appropriate way for systems of ERP to be evaluated from different individual, social, and technical perspectives.

Previous studies have either mainly focused upon issues for implementation, critical factors for success and/or the acceptance and satisfaction of users. However, this research has the view that it is unrealistic to have a model that fits all scenarios and an approach to ERP that is holistic. ERP systems are not information technology solutions nor a blueprint; instead, ERP system can be seen as a way in which an organisation can be moved towards more enhanced effectiveness and efficiency. The management responsible for establishing the strategic direction of the process of implementation needs to understand a multiplicity of closely interrelated factors in order to implement ERP successfully. Moreover, each stage of the process of implementation requires continual monitoring and support. The key issue within a successful project of ERP is to have an understanding of the culture of the organisation and the manner in which business tends to be conducted.

Whilst the literature has numerous examples that cite the barriers, constraints and high rates of failure in implementation of ERP systems within a university environment, there is only rare and patchy research into the critical success factors relevant for the context of implementation of ERP. Seemingly, the primary issue that the context of universities has to take account of is the expectation of the highest performance levels from the users of the ERP systems. A review of literature also shows that there is a need for identification of the factors that can have a bearing on the performance of different users within the universities' context; awareness of such factors could enable the right approach to be defined for universities. There has been broad debate amongst researchers with regard to the significance of the external and internal contextual factors for ERP systems, although most of such research has been in the businesses' and organisations' context within the private sector. There has been very little research conducted within the universities' context, and in terms of investigation of ERP systems, most publications have been in relation to research undertaken within developed countries. There is not only a lack of research for developing countries, and Saudi Arabia in particular, but also there is limited research into the assessment phase of ERP systems in general and the impact of ERP systems upon users within universities in particular; there is, therefore, little specific knowledge within that field. There is no evidence, therefore, of studies undertaken for the investigation of the factors related to ERP systems that have a bearing upon the performance of academic staff within universities in terms of their own perceptions and attitudes.

8.3.2 Research Objective 2

The second research objective was the identification of the factors that have a bearing on the performance of academics whilst they use the systems of ERP within universities in Saudi Arabia. As previously discussed, the results support and align with previous literature within the field of information and ERP systems, which have shone a light on the importance of the factors identified within the current research study for the prediction of the productivity, stratification and performance of different stakeholders. The results showed that there were nine significant factors that have a direct and a significant impact upon the performance of academic staff while using ERP systems within universities in Saudi Arabia, namely: the ease of use, currency, training, tangibility, compatibility, assurance, empathy, timeliness and responsiveness. Each of these are now discussed in turn.

The significant factor of *ease of use* suggests that the implementation of ERP systems needs to be easy for an academic to learn, and the interaction with a system ought to be understandable and clear. The contrasting scenario would be that complex ERP systems and associated technologies could result in unsuccessful implementation since it would be harder for academics, for instance, to take advantage and fully benefit from the features offered. The interview results were consistent with previous research in that they confirmed that the implementation of new systems with easy and user-friendly interfaces yield significant benefits to the academics. Therefore, the factor of ease of use of implemented ERP systems within universities was found to have significance for the level of academics' performance and productivity.

The second factor significant to influence the performance of academics in relation to the use of ERP systems was considered to be *currency*, with its stress on the importance of the ability to acquire data to meet the current needs of academics. So that the needs of academics could be satisfied, the ERP systems should supply the necessary data of the ongoing status of events or operations and up-to-date data with regard to the purpose(s) for the academics' utilisation of the systems. Through the provision of updated data to the academic users, there will be effective enhancement of both performance and productivity; the findings from the interviews gave support to this through showing that the factor of currency has links to the availability of data and the sufficiency of its supply from ERP systems so that the needs of various end-users can be met. Currency plays a significant role, then, in the improvement of the performance of various users of the implemented systems and their productivity.

Training was shown to be another significant factor in relation to the performance of academics whilst using ERP systems. So, it is vital to provide training sessions so that the potential of users for finding, accessing, understanding or using systems of ERP can be enhanced and so that there can be effective use of the ERP system data and procedures. Also, the findings from the interviews confirmed that a significant role was played by suitable employee training for implementing new technologies and systems successfully, in addition to the post-implementation phase(s). So, the factor of training was given equal focus by interviewees within this research in relation to the impact it has upon increasing confidence and knowledge for potential users in the use of implemented ERP systems, and this leads to improvement in academic performance and productivity levels.

The factor of *tangibility* has been shown to have a significant direct impact upon the performance of academics whilst they use ERP systems within their universities with a Saudi Arabian setting. The results of structural equation modelling confirmed that tangibility, in terms of the provision of software and hardware that is up-to-date, improvement of an interface that is visually appealing to the user, and the development of a structure that is user-friendly and navigable to potential users, leads to improved performance of academic users and improvement in their productivity when they use implemented ERP systems within their universities. Similarly, the interviews showed tangibility was a vitally important factor for increasing academic satisfaction and for helping academics to acquire the most up-to-date software and hardware, with compatibility with new system operations, so that every ERP system feature provided can be beneficial to them. Furthermore, the provision of an attractive user-interface that users find approachable can be thought of as a service with tangibility that has the potential of encouraging academics to utilise new systems on a regular basis and to help in reducing resistance of academics to the acceptance of new systems.

The analysis of the findings of the structural equation modelling (SEM) have also highlighted that amongst the elements within the final model that were presented in Chapter 5 within Table 5.36, *compatibility* is a predictor of performance of academics that is affected the most when they use ERP systems within their particular universities. It may be considered, then, that adequate systems that fit with the work environment and the style of working of academics have more positive impacts upon academic performance and their level of productivity. Furthermore, ERP systems need to coordinate with all aspects of the work of academics so that they can be helped in accomplishing tasks in an effective way. In accordance with the interview findings, for the performance and productivity of academics to be enhanced, there needs to be regular updating of the systems implemented so that they continue to have more compatibility with the tasks and duties of academics and, consequently, academics are helped in achieving effective task completion.

Another factor that has a significant impact on the performance of academics when using ERP systems within universities is *assurance*. This factor is in reference to the provision of a safe and secure environment for correspondence and transactions for the team of technical support and academic users of the ERP systems.

Furthermore, assurance directly impacts upon the performance of academics since the factor ensures that the technical support team is constantly courteous to potential users and sufficiently knowledgeable for performing the job well. The findings from the interviews revealed that assurance was a significant factor that plays a primary role in the building up of trust between the technical support team and the academic users of the ERP system; so, the enhancement of the degree of trust between those stakeholders through increases in transactions and correspondence in relation to security has a clear promotional benefit for the satisfaction levels of the academic users. Positive relationships and high levels of trust between the academic users and the technical support team has the potential to lead to significant improvements in academic performance and productivity through use of the ERP systems.

Another predictor of the current context in relation to the performance of academics was found to be *empathy*. Accordingly, for the performance of academics to be enhanced when using ERP systems, there ought to be hours of operation that are convenient to all of the academic users. Furthermore, the team of technical support for ERP systems ought to be tuned into the particular needs of academics so that a sense of work being done empathetically, that is in the best interests of the users, is increased. The provision of individual attention for academic users would have a positive influence upon their performance. These research findings support previous research into Information Systems and ERP systems that was discussed in Chapter 7. Along with the results acquired from the interviews, indication is given that empathy is indeed a significant factor that has considerable impact upon the performance of academics, in addition to leading to an overall increase in their productivity. More attention ought to be paid, therefore, to service development that has the potential of enhancing the emotional aspects of academic use of the ERP systems. For instance, the team of technical support could be trained so that their knowledge and awareness are increased in readiness for potential enquiries from academics. That way, the ability of the team of technical support will be enhanced so they have an appreciation of particular academic needs, and a good impression can be left with the academics. Positive impacts upon psychological aspects of the work of academics whilst using ERP systems can all help enhance performance and increase productivity.

The research has shown that *timeliness* is a significant factor, given that users were concerned with the timely provision of necessary information by the ERP systems, as well as completion of necessary regular activities on time, such as the running of timetables or printing of reports. So, the provision of services that are faster helps to enhance academic user performance and productivity. As discussed previously in Chapter 7, this finding is consistent with previous research undertaken within the fields of Information Systems and the field of ERP systems. Furthermore, the findings from the interviews did confirm that timeliness was significant in being a factor that was advantageous when ERP systems were being used, particularly by academics within universities; it is clearly possible to see this in the effectiveness of ERP in terms of daily output in comparison to a legacy system. The reason for this is because ERP systems offer access to the data that academics require in a timely fashion and this then leads to reduction in the time taken for completion of tasks and jobs. Enhancement of the efficiency of academic users, therefore, is achieved by reduction in the time and effort required when using the ERP systems, which, consequently, leads to enhanced performance and productivity levels.

Lastly, the factor of *responsiveness* was found, within the SEM results in the current research, to be a significant factor that had a significant impact on the performance of academics when using ERP systems. The responsiveness factor was found to be a significant factor for enhancing the performance within the current Middle Eastern region. However, amongst all of the 9 factors, the responsiveness factor was found to have the least degree of significant impact directly upon the performance of academics. There is the suggestion that technical support teams ought to provide services to users that are prompt, and they ought never to be too busy to provide potential users with the response they want. Furthermore, technical support teams ought to always have a willingness to give the academic users the help they need, in addition to letting them know the precise time when new services are to be provided or when services will be fixed. The findings from the interview have affirmed that the factor of responsiveness has importance through simplification of new system functionality and enhancement of the performance of academics. Furthermore, the actual provision of a team of technicians to offer support and to respond to the queries of the end users is vital for maintaining the success of new systems. Moreover, the team of technical support has to be able to demonstrate a willingness to find solutions to technical problems and a general level of interest in answering the queries of the end users. The teams for technical support within universities, then, require special communication training for helping users in the solution of technical problems and increasing the trust between them and the academics; that way, results will be achieved that have a positive impact upon academic user performance and productivity.

8.3.3 Research Objective 3

The third research objective within this current study was for the highlighting of differences between different factored academic groups with regard to attitudes about their own performance as a dependent variable (DV), whilst ERP systems are used. The findings from the analysis of the quantitative data showed that all of the groups proved to have influence in the determination of factors with a significant impact upon the performance of academics whilst they use ERP systems within their universities. A summary of the descriptive analysis findings is as follows:

Years of experience, regularity of system use, and job title were shown to have at least one type of difference between factored means with regard to the DV. Factored groups in relation to working experience showed some differences between participants with over twenty years of experience and those with below five years of work experience. Furthermore, there were differences within answers with regard to DV for those with over twenty years of experience and those of between five and ten years of experience. With the factored means in relation to job title, differences were revealed between the group for lecturers and teaching assistants and the group for lecturers and assistant professors.

A fifth of the demographic questions in relation to experience levels in the use of ERP, had findings which showed no differences between the factored means, illustrating that most participants tended towards one measure scale side in relation to DV.

Regarding the regularity of system use, differences between the factored means showed between daily use and every other of the factored means, i.e. annually, weekly and monthly. Explanation for this finding could be that academics who use systems daily had a tendency towards agreement when compared with other groups with concern for DV.

There were no differences revealed between the groups for gender concerning answers with regard to the DV. Similarly, the results for the seventh question with regard to administrative duties, revealed no difference with the no or yes answers for the factored groups concerning the DV. Explanation for this could be that academics with duties of administration and with no administration duties tended to have similar agreement concerning their answers about the importance of the ERP systems in their performance and productivity.

8.3.4 Research Objective 4

Research objective no.4 had the aim of testing and validating the model of the research to see if it could be effective for the explanation and prediction of factors with a direct and significant impact upon the performance of academics while using ERP systems within Saudi Arabian universities. The results showed that the finalised model of research did explain a high proportion of factor variance with a direct influence upon the performance of academics when using ERP systems within the research context. The study has been successful in catching the most significant factors that have a direct and a significant impact on academics' performance whilst using implemented ERP systems within the universities; indeed, 74.2% of variance was explained by the model. Predictors of the performance of academics provide explanation for 74.2% of variance; expressed another way, the error variance related to the performance of academics is around 25.8% of variance of academics' performance. The current research study results show that, overall, the model proposed has a good degree of explanatory power and, therefore, has robustness in relation to the performance of academics whilst utilising ERP systems within Saudi Arabian universities.

Moreover, the results from the analysis of the interviews stressed the significance of the factors of the research model in the dimensions of both service quality and system quality; indeed, the understanding of the factors has been extended based upon the perceptions of the interviewees as shown in Table 8.1 below. The perceptions that were established within this research have shown themselves to be comprehensive and a simple manner in which to understand the factors that were found to impact upon the performance of academics when utilising implemented ERP systems with the current context. This was done through reflection of the characteristics and nature of those factors. Meaningful implications can be drawn from these perceptions in terms of the way in which systems of ERP ought to be conceptualised, developed and improved and given assessment by the management of a university or any other parties concerned.

Table 8.1: Interviewees' Perceptions	
System Quality Factors	**Summary of the Interviewees' Perceptions**
Currency	The data required ought to be readily available and sufficient for meeting potential user requirements; The data provided ought to be adequate for helping academic users be effective in accomplishing tasks; All of the data that the ERP systems provide ought to have accuracy and be saved securely.
Ease of use	The systems ought to be easy to use, reliable, have minimal errors and be accompanied with clear instructions; The complexities of systems of ERP and associated technologies could result in implementation being unsuccessful, so procedures should be easy to follow and remember, resulting in lower levels of mental stress; The provision of an easy and user-friendly interface yields significant benefits for academics so that their productivity can be increased; Potential users need the provision of easy access to all the functions and data required.
Training	Becoming familiar with services enables awareness of their capabilities and helps enhancement of self-confidence in their use. Training sessions for users help in the facilitation of better initial use, minimisation of related uncertainties and establishment of future practice that is effective. Provision of adequate knowledge with regard to the implemented ERP systems leads to increased confidence of potential users so that tasks can be run and accomplished through such systems.
Timeliness	The necessary information that the users require ought to be provided on time. Presentation of regular activities such as the printing of reports and timetables ought to be done from systems without delay. Information is updated on systems regularly and in a timely manner so that the performance and productivity of potential users can be enhanced.
Compatibility	The services ought to be convenient and flexible so that they can be used anywhere and at any time. Systems ought to be able to perform several operations simultaneously and independently. ERP systems ought to operate and fit within the environment and the style of the potential users. ERP systems ought to be provided that are compatible with the particular aspect of the duties and tasks of the academic users.
Tangibility	The most up-to-date software and hardware ought to be provided that matches the functions of the systems for potential users so that there is maximisation of the potential benefits accrued from them. Improvement to the ERP system interface, such that it is visually appealing to users, will help in the simplification and facilitation of the working of the system for the users. Simplification of the structure of the systems of ERP and their navigation functions help to make the systems more user-friendly for potential users.
Responsiveness	The technical support teams for ERP systems ought to provide services to users promptly. The team of technical support ought to be actively engaged with a willingness to help potential users. Notification of when services will be fixed or new services performed should be provided.

Assurance	The correspondence and transactions between the potential users and the technical support teams ought to be secure and safe. The team of technical support ought to be constantly courteous to the users when dealing with their requests. The knowledge levels of the team of technical support ought to be enhanced so that work is done effectively.
Empathy	The hours of operation ought to be convenient for potential users. The team of technical support ought to have an understanding of the particular needs of academic users so that requests can be dealt with in a way that helps the users feel like the work is being conducted in their best interests. Systems of ERP ought to pay particular attention to potential users through, for instance, the setting of a background that is personalised or the provision of a special greeting.

Source: Compiled by the researcher.

8.4 Contribution to Knowledge

The final research results for this study are founded on the empirical data that was collected from academic staff within universities in Saudi Arabia as a developing country within the Middle East, and has many common characteristics (cultural, economic and political) with other Gulf Cooperation Council Countries such as Kuwait the United Arab Emirates and Bahrain. There is sound justification for claiming that the findings could be applied to a wider set of ERP systems to be diffused within other Middle Eastern countries. This research contributes to the body of knowledge that exists in relation to ERP systems and their impact upon academics' performance and, in particular, in relation to the evaluation of performance. Even more specifically, the research provides several practical and theoretical contributions that could be beneficial for researchers of Information Systems and ERP systems, as well as beneficial for stakeholders working within the universities' context within developing countries, especially those in the Arabian Gulf and Middle East region as a whole.

8.4.1 Theoretical Contribution

The literature in relation to Information Systems and ERP has a dearth of empirical research with regard to determinants of the factors that have an impact upon the performance of academics whilst utilising ERP systems. This research study, however, has provided an examination of the viability of the model of research proposed, using the example of Saudi universities, for explanation of the factors that have a direct and significant influence on academics' performance when using implemented ERP systems. As such, the current research findings contribute to filling such an important gap in the existing body of knowledge through an empirical investigation that is theory-based in relation to the factors that have an influence upon the performance of academics whilst utilising ERP systems within a developing country context.

Another important contribution to existing theory from this study is research model validation through the collection of empirical data from academic members of staff within a developing Middle Eastern country, Saudi Arabia. The adapted model was formed from the integration of the TTF, EUCS and D&M information systems success models. A total of 19 variables were blended and integrated into one single model which then underwent testing for its explanatory and predictive power in determining which factors had a bearing on the performance of academics when using ERP systems within Saudi universities and within similar circumstance within other developing countries. The current study findings reveal that the final version of the refined model has validity and it exhibits explanatory power at a good level for prediction of the factors that have a direct and significant influence upon the performance and productivity of academics when they use ERP systems.

Many existing models of evaluation, including the Task-Technology Fit, End Use Computer Satisfaction, and Technology Acceptance Models, tend to lean towards examination of Information Systems and ERP systems from a technical perspective. So, the importance of the framework that has been adapted would be highlighted through inclusion of the dimension of service quality, which shows the social and individual perspectives as well as the dimension of the system quality, which shows the technical system perspective. This research contributes to the literature on Information Systems and ERP systems through its investigation of the role played by the personal characteristics of potential users and its focus upon which factors have a significant impact upon performance of academics whilst utilising the systems of ERP. The model proposed extends the more traditional type of technical models through inclusion of factors related to service quality as well as technical factors from the EUCS and TTF models. The research findings also shine a light upon the factors that have a high degree of impact upon the performance of academics when they are utilising ERP systems. So, the developed model can be applied to other circumstances when it is intended to attempt to understand the motives of potential users in regard to acceptance of new systems that are similar.

Moreover, this research study makes a theoretical contribution through provision of further insight into influential factors with regard to the performance of academics when utilising ERP systems. The research identified nine factors considered the most significant ones for predicting academics' performance when using ERP systems. These predictive factors, ordered in increasing level of importance are as follows: compatibility, empathy, ease of use, currency, timeliness, assurance, training, tangibility and responsiveness.

When it is considered that, in general, there is a limited amount of empirical research related to integration of two technological Information Systems and ERP systems, or more than two, this research has tested an integrated and extended model for users that are academic members within a particular context, which is the universities' context in Saudi Arabia as a developing country. The result is that existing knowledge has been expanded by this research through the provision of a new perspective on the three integrated models: TTF, EUCS and D&M information systems success models by way of the validation. Also, the result is that the model, once validated, has provided a greater appreciation of the significant factors that have an impact on the performance of academics when using ERP systems and, at the same time, the model enhances the power of explanation of both the service and system quality dimensions.

Taken from a perspective of context, this research fills a gap in the literature related to ERP systems within the Middle East through its examination of those factors that could encourage or act to impede the performance of academics when using ERP systems. The research design that was applied within this research was mixed-methods approach that was applied nationwide to Saudi Arabia. The research involved the application of two phases of data collection; firstly, there was the collection of quantitative data within a first phase that used a questionnaire survey and, secondly, there was a phase for qualitative data that involved the conducting of semi-structured interviews. Linkages both across and within the two phases of research were made so that a clearer picture could be acquired of those factors that have a significant impact upon the performance of academics whilst using ERP systems within the universities' context. Furthermore, as far as the researcher is aware, this research is the first of its kind within the context of Saudi Arabia that examines, in general, academic staff in Saudi universities.

8.4.2 Practical Contribution

The research results have implications for academic users, being one of the key stakeholders within universities. These research results offer a framework that is comprehensive for assessing both social and technical dimensions in order to help in the identification of factors that have a direct and significant impact on the performance of academics whilst utilising ERP systems, and to facilitate a greater return on investment in the implementation of such systems within universities. So that successful post-implementation for ERP can be assured, there is importance in universities acquiring comprehensive appreciation of the predisposition of academics for accepting and improving upon their performance through the use of the systems implemented. There is a belief that such an understanding would enable universities to have greater effectiveness for allocation of resources - a key issue, given the huge investment that ERP systems entail. With regard to the aforementioned matters, nine significant factors were identified in the current research that have an influence upon the performance of academics when using ERP within the universities' context in Saudi Arabia. Having an appreciation of these factors that have an impact upon the performance and productivity of academics would help facilitate a greater, in-depth understanding of the requirements of potential users in developing countries by the top management of universities. This ought to help in development of strategies that are suitable and that are aimed at the development of the systems to be implemented, or for improvement to implementation of ERP systems in the future.

In addition, this research offers insights of value into how the performance of academics can be enhanced as they use ERP through indication of the relative significance of factors that have an impact on academics' performance and productivity. So, consideration could be given by decision makers to the differences between the relative importance of these different factors for academic performance and productivity when ERP systems are either designed or developed. For instance, universities ought to focus a greater degree of attention upon the factor of compatibility given its importance; indeed, compatibility has the greatest impact upon the performance and productivity of academics when using implemented ERP systems. Moreover, this research has examined the developed model and validated it within the context of a developing country, and identified the factors that most significantly impact upon the performance of academics when utilising ERP systems within their university settings. Application of the model could be done within other developing country settings that have similar cultures; that way, there is provision of a tool that would be effective, in general, for enhancing academic performance and productivity when utilising ERP systems, and, more particularly, for academic users within the Middle East and within countries in the region of the Arabian Gulf.

8.5 Recommendations

The review of literature and the empirical study findings show that Middle Eastern universities should not overlook the evaluation of various systems and technologies and the impact that they have upon the performance of different stakeholders, particularly academic members of staff. Such evaluation is essential if universities within Middle East countries are to be competitive and in the position where they are receiving a suitable return on their investments. Within this current research, there has been identification and explanation of the factors that are considered significant in influencing the performance of academics whilst they use ERP systems, as well as the characteristics for potential ERP system users.

Based upon the aforementioned research work, then, several recommendations can be made for the management of universities and other institutions of higher education in the Middle East region as follows:

These research results could be helpful to the top management and IT departments of universities since they can support decision making related to the deployment and development of ERP systems; this support can occur through the provision of key information with regard to factors that have a significant impact on the performance of academics whilst they are using ERP systems. For instance, universities may be helped in building ERP systems with good designs that can be accessed easily, that are user-friendly, and that have compatibility with the lifestyles of the academics. Such designs can help create a service that is compatible with the interests and needs of academics.

So that the performance of academics can be enhanced whilst ERP systems are being used, the strategies of universities could lead to greater emphasis upon the design and development of services of ERP systems that are more useful. For instance, the study results have shown that the dimension of service quality makes an effective contribution to ERP system success during all of its stages. The semi-structured interview results have also shown that ease of use is usually defined by users in relation to having access anywhere or anytime, as well as the ability of changing incorrect data entries without necessitating the following of complex old procedures that academics have been expected to follow because of the legacy systems. As such, in order for universities to have competitive advantage, and be successful, they ought to be more focused upon continuous improvement in their ERP systems in ways that carefully align with the tastes of academics in relation to their currency, their timeliness and their ease of use. Furthermore, universities ought to ensure that their systems for the operation of ERP are sufficiently quick to save the time of academic members of staff. In addition, universities ought to assure that ERP systems provide the information required with the necessary clear instructions so that the specific services of academics can be delivered with minimal technical and transactional errors. As the majority of interviewees noted, academics tend to consider that productivity and performance will be enhanced if they have enough information that is adequate for fulfilment of their needs, with user access that is friendly, from ERP systems that provide speedy services.

It was reported that training had a significant association with successful implementation of ERP systems during all the phases. It is important, then for universities to concentrate upon enhancing the perceptions that academics have of training sessions for ERP systems. Such focus could be achieved by allocating numerous sessions for showing how the system is used. That way, knowledge of the services of ERP systems can be enhanced whilst, simultaneously, improving the perceptions of them by overcoming fears of them being overly complex and showing that they are easy to use. Furthermore, the findings from the interviews showed that training is valued by academics for helping them feel comfortable with the use of ERP systems and for raising awareness of how they can improve their performance and productivity within their working environment.

More efforts ought to be made by universities for the building of trust between academic members and technical support teams through bringing about a greater degree of confidentiality for correspondence between them. Furthermore, improvement to technical support team knowledge is important, especially with regard to ERP systems, so that they have enhanced confidence levels to ensure the queries of academics with regard to ERP systems are answered and solved well. This can be achieved through development of intensive sessions of training with the vendors of ERP systems and further partners. Also, information provided ought to include reference to security and safety issues.

Further programmes for raising awareness ought to be provided by universities, along with dissemination of relevant information associated with ERP systems, so that academics and other potential users have enhanced knowledge about the advantages of ERP systems, and that they are cognisant of security and safety matters for themselves and others.

Universities within developing countries ought to introduce co-ordinated sets of practices for providers of ERP systems to follow so that the quality of service can be improved, to provide overall consistency and security to the infrastructure of communication, and to minimise the interruptions to connection.

Success for technology-based services is dependent upon both telecommunication availability and consistency, and usage that is tangible in the delivery of services. So, there ought to be provision of adequate, suitable technical infrastructure, software and hardware that is up-to-date and that fits with the ERP systems.

So that confidence is increased in their use of ERP systems and resistance avoided, technical support teams ought to show a willingness to give academic users help in fixing problems and dealing with enquiries related to the implementation of the systems.

More attention ought to be paid by universities to the development of services in ways that improve the emotional side to the use of ERP systems by academics, for instance, having the provision of operational hours that are convenient. Also, there ought to be individual attention paid to users such as preparation of specific greetings when academic users begin to access ERP systems, which would help satisfaction levels to be increased and help academic users feel as if their interests are a key priority.

8.6 Limitations of this Study

Any research has limitations and this study is no exception. The current research also has several limitations. Consideration ought to be given to the limitations that are shown below when trying to generalise the findings to an entire research population or when attempting the application of the proposed model to another research setting; the limitations of this research are as follows:

The sampling frame represents the total academic population because of the lack of current, accurate and complete information with regard to all of the institutes of higher education in Saudi Arabia. The researcher made every effort to transcend this particular study limitation through inclusion of just those subjects who were academic members at Saudi universities; however, acknowledgement is given that the representativeness and size of the research population sample would have had more accuracy if founded upon a sampling frame that was focused in a strategically different way to enable the production of results that would have been more generalizable.

Given the resource restrictions in terms of energy, funding and time, not all of the Saudi institutes of higher education were included within the questionnaire survey sampling process. Whilst the study findings are generalizable with confidence to the research population overall, the study researcher has awareness that this generalisability could have been enhanced through the inclusion of a greater number of institutes of higher education.

The generalisability of the study findings of this current research is limited to the particular context in question. There may be different circumstances and systems within other countries, and settings may be subject to different legal influences and different regulations. So, if attempting the generalisation of this study or if the proposed model of this study is applied to settings in other countries, the contextual differences ought to be given due consideration.

Another limitation stems from the fact that the data collection instruments' questionnaire and interview questions used for this study were translated from English into Arabic. The translation process involving two unrelated languages at linguistic and cultural levels is another cause for potential limitation, as loss of meaning during the translation process is inevitable. Although the loss of meaning is minimised by checking its accuracy with translation experts, something is always lost in translation, especially between Arabic and English as these two languages operate on different mind-sets.

The researcher experienced some challenges in attempting to arrange the semi-structured interviews. Making arrangements for academics working in top management in university, because of their busy schedule and sometimes for a variety of personal reasons, was challenging. The researcher, then, relied upon the assistance of the deanship of scientific research at the University of Taibah, situated within the Saudi city of AL Madinah AL Munawarrah. Help was given in arranging the allocated participant interviews and, furthermore, in formally posting the questionnaire to the academic members of staff at the various Saudi universities. It is clear, then, that considerable effort was made to ensure that the most suitable interviewees were chosen and that the data from the interviews was reliable and valid. However, the truth remains that the semi-structured interviewees may not have been the best possible sources of qualitative data despite the participants' willingness to cooperate. Also, given the resource restrictions in terms of effort required, funding and time, it was difficult to make more than one journey to Saudi Arabia from the United Kingdom to undertake the interviews.

The data within this research was collected from academic members, being key stakeholders within the universities of Saudi Arabia. The study intention was to undertake an investigation into the factors that impact significantly on the performance of academics while using ERP systems within the work environment of Saudi universities. The generalisation of the results, therefore, ought to be limited to the context of universities within Saudi Arabia because of the impact of differences in social, political and economic circumstances.

8.7 Suggestions for Future Research

Building upon the study findings of this research, several suggestions can be made for conducting potential research in the future as follows:

So that the generalisability of findings can be improved, the initial framework of this research and the model that was proposed could be employed in the investigation of factors that have an influence upon other stakeholders whilst the system of ERP is being used, especially within the context of the higher education sector, but also within other sectors within the Middle East region.

So that the external validity of the model proposed within this research can be enhanced, research in the future can be steered towards the examination of those factors that significantly impact on the performance of academics while using ERP systems within other countries that have a similar context to the Saudi Arabian one, such as the countries of the Arabian Gulf region.

A further interesting approach would be to undertake replicas of this research within various different cultural contexts, within perhaps developed and developing country settings to draw comparisons. Such research would enhance an appreciation of the effects upon the perceptions and attitudes of academics and various cross-cultural factors. It would help in generating further understanding of what has a significant impact upon the performance and productivity of various stakeholders, and provide verification of research model robustness when employed in various cultural contexts.

As the study data were limited, in that they were collected using a cross-sectional survey at one particular time, it could be useful to undertake in-depth research that is longitudinal. This would enable determination of whether the perceptions and attitudes of academics, with regard to the key factors that have an impact on performance whilst the ERP system is being used, have altered over time. Such an approach could be undertaken through application of the model of research to the evaluation of the impact of ERP systems upon the performance of academics at various points in time, and then making a comparison between the various findings from various periods of data collection.

The model proposed can be used in the provision of insights that have value regarding those factors that have a significant influence on the performance of academics whilst ERP systems are being used in a university setting. However, research in the future could potentially be steered in the direction of improvement of the predictive powers of the model through the inclusion of further factors that could, potentially, be more significant.

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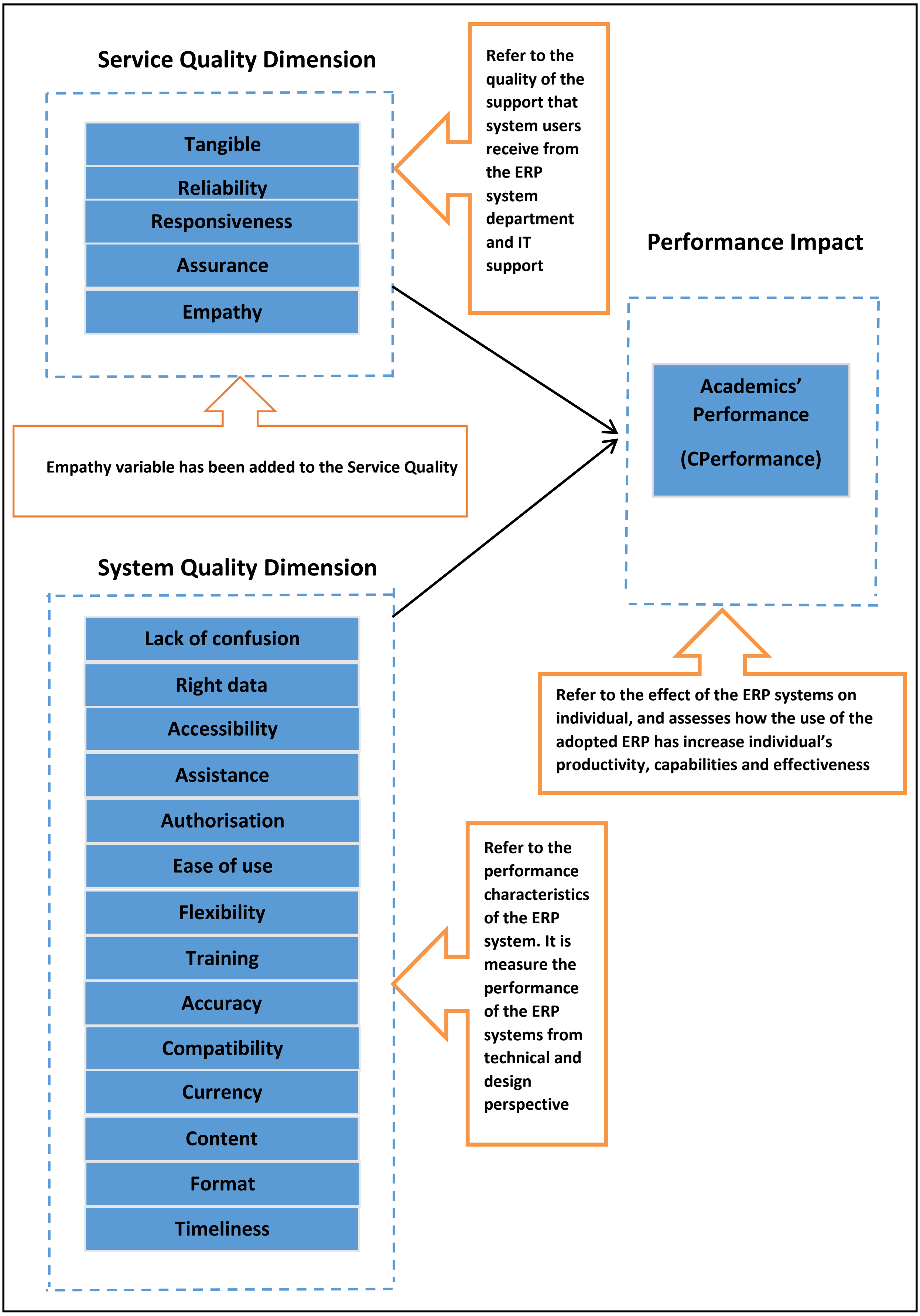
APPENDICES

Appendix 1: The Final Design of the Adapted Initial Framework



Appendix 2: The Final Version of the Questionnaire

LIVERPOOL JOHN MOORES UNIVERSITY

Title of Project*:*

THE IMPACT OF ENTERPRISE RESOURCE PLANNING (ERP) SYSTEMS ON THE PERFORMANCE OF ACADEMICS WITHIN THE CONTEXT OF UNIVERSITIES IN SAUDI ARABIA.

Name of Researcher and School/Faculty: Mohanad Alhebishi (Liverpool Business School)

To all Participants please read the following information carefully.

INTRODUCTION: You are being invited to take part in a research study. Prior to your decision to participate, it is important that you understand why the research is being done and what it involves. Please take time to read the following information. Ask us if there is anything that is not clear or if you like more information.
What is the purpose of the study? The aim of this study is to investigate the factors that significantly impact academics' performance while using Enterprise Resource Planning Systems (ERP) in Saudi universities sector. This is part of a PhD study to develop strategies/ suggestions that will help Saudi universities to improve their academics' performance while using ERP systems.
Do I have to take part? It is up to you to decide whether or not to take part. If you do, you will be given this information sheet and asked to sign a consent form. You are still free to withdraw at any time and without giving a reason. A decision to withdraw will not affect your rights/any future treatment/service you receive.
What will happen to me if I take part? Your participation in the study is by being involved in a questionnaire that would serve as the primary source of data. The questionnaire would last approximately 20 minutes to 30 minutes, and would focus on the study. The data collected in this study will be used for academic purposes and none of the participants' personal data in this study will be use. The researcher will take the written questionnaire from the collected data to United Kingdom (Liverpool) for analysis reasons and will be treated in a high confidentiality. The data collected will be stored in a password-protected computer in Liverpool John Moores University and the hard data will be kept in a locked cabinet. All the data collected recording and written will be used during the period of this study, which will last for 2-4 years and after worth will be destroyed. The participation is anonymous and no names will be used in the study itself or in any further publications. The gained data will be used strictly for academic purposes. Therefore, I can confirm that there will be no risks to you due to your participation.
Are there any risks involved? There are no risks involved in this research. Participant contribution will enhance this study by providing the required information, which will enable the researcher

to develop recommendations/ suggestions that will help Saudi universities to improve their academics' performance while using ERP systems.
Will my taking part in the study be kept confidential? Your participation in this study will be kept confidential. The interview will be recorded, and later transcribed before analysis. During and after the study, the recorded interview material and transcription will remain locked up in research cupboard with accessibility only to the researcher. All information provided will be used only in the manner allowed by you.
What are the inclusion criteria? Questionnaire will be administrated to Academics in the different faculties.
What are the exclusion criteria? - Employees who are not academics staff will be excluded from questionnaire. - New Academics who are working in the university less than six months will be excluded from questionnaire.

Lastly, I would like to assure you that this study has been reviewed and received ethics approval through the Office of Research Ethics at the Liverpool John Moores University (LJMU). However, the final decision about participation is yours. I would hope that the result of this study would benefit the school and international students. I look forward to your response and thank you in advance for your assistance in this project.

Contact Details of Researcher:
Mohanad Alhebishi,
Liverpool John Moores University,
m.h.alhebishi@2014.ljmu.ac.uk

Contact Details of Academic Supervisor:
Dr. Bob McClelland
BSc, MSc, DMS, PhD, FIS, FHEA
Reader in
Educational Technology, Chair of Research
Forum at Liverpool Business School.
B.McClelland@ljmu.ac.uk

SECTION (1)

General information

***(Please tick (√) in the appropriate box for the following questions)**:

1- Academic qualifications.
☐ **PhD** ☐ **Masters** ☐ **Bachelor** ☐ **Other…………………**
2- Job title.
☐ **Professor** ☐ **Associate Professor** ☐ **Assistant Professor** ☐ **Lecturer** ☐**Teaching assistant** ☐ **other……………**
3- Area of expertise.
☐ **Business & Law** ☐ **Computer Science** ☐ **Medicine** ☐ **Engineering** ☐**Education** ☐ **Other………**
4– Years of employment at this university.
☐ **Less than 5 years** ☐ **5 – 10 years** ☐**11 – 15 years** ☐ **16 – 20 years** ☐ **More than 20 years.**
5- Years of experiences using the Enterprise Resource Planning (ERP) systems at this university.
☐ **Less than 2 years** ☐ **3 – 4 years** ☐ **5 – 6 years** ☐ **7 – 8 years** ☐ **9 – 10 years** ☐ **More than 10 years.**
6- You are using the ERP systems.
☐ **Daily** ☐ **Weekly** ☐ **Monthly** ☐ **Annually** ☐ **Other……………**
7- Have you ever been in charge of any administrative duties besides academic position at this university?
☐ **Yes** ☐ **No.**

SECTION (2)

(Performance impact)

This section refers to the effect of the ERP systems on the individual, and assesses how the uses of the ERP systems have increased productivity, capability and effectiveness for academic staff. **Using the rating scale provided, please tick (√) in the box that indicates your level of agreement/ disagreement with the following statements:							
No.	**Statements**	**Level of agreement/ disagreement**					
Academics' Perfromance		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
1	The ERP systems have positive impact on the productivity of my job.						
2	The ERP systems help me be more effective in my job.						
3	The ERP systems reduce the time taken to accomplish my tasks.						
4	The ERP systems let me do more work than was previously possible.						
5	The ERP systems are an important aid to me in the performance of my job.						
6	The ERP systems enhance my awareness about the systems.						
7	The ERP systems facilitate quick information retrieval.						
8	It is easy with the ERP systems to find solutions to problems.						
9	The ERP systems help me to identify problems.						
10	It is easy to detect possible errors in the ERP systems.						

SECTION 3

System quality

This section refers to the performance characteristics of the ERP systems. It measures the performance of the ERP systems from the technical and design perspective.

*****Using the rating scale provided, please tick (√) in the box that indicates your level of agreement/ disagreement with the following statements:***

No.	**Statements**	**Level of agreement/ disagreement**					
Ease of use		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
1	It is easy to learn how to use the ERP systems, which gives me access to data.						
2	I find the ERP systems easy to use.						
3	I find it easy to get the ERP systems to do what I want it to do.						
4	My interaction with the ERP systems is clear and understandable.						

	Accessibility	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Don't Know
5	I can get data quickly and easily when I need it.						
6	It is easy to get access to data that I need.						
7	The information in the ERP systems is easily retrievable.						
	Assistance	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
8	I can get the help that I need in accessing and understanding the data.						
9	It is easy to get assistance when I am having trouble finding or using data.						
	Authorization	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
10	Data that would be useful to me are unavailable because I don't have the right authorization.						
11	Getting authorization to access data that would be useful in my job is time consuming and difficult.						
	Flexibility	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
12	The ERP systems are too inflexible to be able to respond to my need for changing data.						
13	I am not getting as quick a turnaround as I need on requests for new reports or data.						
	Training	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
14	There is not enough training for me on how to find, understand, access, or use the ERP systems.						
15	I am getting the training I need to be able to use the ERP systems procedures and data effectively.						
16	I do not have time to attend any of the provided training session.						
	Accuracy	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
17	The data that I use are accurate enough for my purposes.						
18	Irregularly, there are accuracy problems in the data I use or need.						
	Compatibility	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
19	Using the ERP systems fits into my work style.						
20	The ERP systems are compatible and matched with all aspects of my work.						
21	Using the ERP systems fits well with the way I like to work.						

22	The ERP systems are suitable for my needs and help me to accomplish my tasks.						
	Currency	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
23	I can get data that is current enough to meet my needs.						
24	I need some data on the up-to-the-minute status of operations or events but cannot get it.						
25	The data is not up-to-date enough for my purposes.						
	Right data	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
26	It is more difficult to do my job effectively because some of the data I need are not available.						
27	The data maintained by the ERP systems is pretty much what I need to carry out my tasks.						
28	The ERP systems are missing critical data that would be very useful to me in my job.						
	Lack of Confusion	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
29	The data are stored in so many different places and in so many forms; it is hard to determine how to use them effectively.						
30	There are so many different producers in the ERP systems, each with slightly different data, that it is hard to understand which one to use in a given situation.						
	Timeliness	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
31	The ERP systems provide me with information that I need just on time.						
32	Regular activities in the ERP systems (such as printed report or running timetables) are completed on time.						
33	The information contained in the ERP systems is timely and regularly updated.						
34	The ERP systems provide me with the necessary information in a timely manner.						
	Content	**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
35	The ERP systems provide reports that seem to be just about exactly what I requested.						
36	The ERP systems provide sufficient information to my needs.						

37	The information contents provided by the ERP systems meet my needs.						
38	The ERP systems provide the precise information I need.						
Format		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
39	The output of the system is presented in an expected and easy format.						
40	The ERP systems provide clear information.						
41	The data that I need are displayed in a readable and understandable form.						

SECTION 4

Service Quality (Technical support):

This section refers to the quality of the support that system users receive from the ERP systems department and IT support.

*****Using the rating scale provided, please tick (√) in the box that indicates your level of agreement/ disagreement with the following statements:***

No.	Statements	Level of agreement/ disagreement					
Reliability		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
1	When ERP systems promises to do something by a certain time, it does so (such as provides new requests, information and services did not exist in the system before).						
2	When users have a problem, the ERP systems show a sincere interest in solving it.						
3	The ERP systems are dependable.						
4	The ERP systems provide its services at the time it promises to do so						
5	The ERP systems insist on error-free records by the users.						
Responsiveness		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
6	The ERP systems technical support team give prompt service to users.						
7	The ERP systems technical support team are always willing to help academic users.						
8	The ERP systems technical support team are never too busy to respond to academic users' requests						
9	The ERP systems technical support team tells users exactly when services will be performed (such as						

	the precise time to fix an error or a problem in the system)						
Assurance		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
10	Users will feel safe and secure in their transactions and correspondence with the ERP systems user support team.						
11	The ERP systems technical support team are consistently courteous with users.						
12	The ERP systems technical support team have the knowledge to do their job well.						
Empathy		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
13	The ERP systems have operating hours convenient to all its academic users.						
14	The ERP systems have the users' best interests at heart.						
15	User support team of the ERP systems usually understand the specific needs of the users.						
16	The ERP systems give academic users individual attention.						
Tangible		**Strongly Agree**	**Agree**	**Neutral**	**Disagree**	**Strongly Disagree**	**Don't Know**
17	The ERP systems have up -to- date hardware and software.						
18	The ERP systems its interface is visually user appealing.						
19	The ERP systems structure and navigation are usually user-friendly.						
20	The integration capability of the ERP systems with the academic users are feasible and enables the provision of the kind of service promised.						

***Please feel free to add any comment, or opinion as this will be valuable to the research.**

..
..
..
..

This is the end of the questionnaire, Thank you very much your cooperation which is much appreciated

Mohanad Alhebishi

Appendix 3: Bivariate Method Correlation Among all Variables

Correlations

		CIAP	CTTCT	CACP	CIRI	CAIPS	CEOU	CAcce	CAssi	CAuth	CFlex	CTrai	CAccu	CComp	CCurr	CRD	CLC	CTime	CCont	CForm	CReli	CResp	CAssu	CEmpa	CTang	System Awareness
CIAP	Pearson Correlation	1	.568**	.659**	.243**	.425**	.040	.423**	.424**	-.004	.095*	.140**	.195**	.583**	.109*	.143**	.220**	.242**	.612**	.562**	.552**	-.034	.263**	.059	.350**	.354**
	Sig. (2-tailed)		.000	.000	.000	.000	.397	.000	.000	.936	.042	.003	.000	.000	.020	.002	.000	.000	.000	.000	.000	.464	.000	.210	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CTTCT	Pearson Correlation	.568**	1	.471**	.316**	.394**	.095*	.511**	.326**	-.137**	.215**	.207**	.069	.415**	.271**	.159**	.283**	.133**	.477**	.383**	.399**	-.074	.158**	-.024	.133**	.181**
	Sig. (2-tailed)	.000		.000	.000	.000	.043	.000	.000	.003	.000	.000	.138	.000	.000	.001	.000	.004	.000	.000	.000	.113	.001	.604	.004	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CACP	Pearson Correlation	.659**	.471**	1	.499**	.516**	.100*	.570**	.486**	-.056	.137**	.137**	.336**	.661**	.140**	.192**	.229**	.351**	.612**	.568**	.574**	.014	.388**	.121**	.317**	.167**
	Sig. (2-tailed)	.000	.000		.000	.000	.032	.000	.000	.233	.003	.003	.000	.000	.003	.000	.000	.000	.000	.000	.000	.762	.000	.010	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CIRI	Pearson Correlation	.243**	.316**	.499**	1	.453**	-.013	.442**	.388**	.028	.206**	.142**	.323**	.433**	.274**	.148**	.005	.265**	.395**	.302**	.198**	.000	.057	.053	.178**	.157**
	Sig. (2-tailed)	.000	.000	.000		.000	.781	.000	.000	.553	.000	.002	.000	.000	.000	.002	.911	.000	.000	.000	.000	.995	.222	.260	.000	.001
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CAIPS	Pearson Correlation	.425**	.394**	.516**	.453**	1	-.017	.406**	.567**	-.174**	.108*	.139**	.258**	.404**	.216**	.159**	.071	.194**	.573**	.292**	.430**	-.027	.211**	.093*	.262**	.163**
	Sig. (2-tailed)	.000	.000	.000	.000		.715	.000	.000	.000	.021	.003	.000	.000	.000	.001	.132	.000	.000	.000	.000	.565	.000	.047	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CEOU	Pearson Correlation	.040	.095*	.100*	-.013	-.017	1	.109*	-.008	-.023	.000	.052	-.027	.098*	.080	.051	.000	.023	.031	.064	.058	.029	.085	.001	.008	.046
	Sig. (2-tailed)	.397	.043	.032	.781	.715		.019	.869	.630	.998	.270	.566	.037	.086	.272	.993	.625	.504	.173	.216	.537	.068	.985	.870	.329
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CAcce	Pearson Correlation	.423**	.511**	.570**	.442**	.406**	.109*	1	.425**	-.046	.106*	.131**	.208**	.599**	.243**	.186**	.196**	.251**	.573**	.544**	.476**	-.022	.141**	.125**	.354**	.348**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.019		.000	.327	.024	.005	.000	.000	.000	.000	.000	.000	.000	.000	.000	.641	.003	.008	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CAssi	Pearson Correlation	.424**	.326**	.486**	.388**	.567**	-.008	.425**	1	.028	-.011	.241**	.323**	.484**	.244**	.240**	.046	.302**	.623**	.455**	.608**	.121**	.375**	.078	.368**	.240**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.869	.000		.546	.823	.000	.000	.000	.000	.000	.331	.000	.000	.000	.000	.010	.000	.096	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CAuth	Pearson Correlation	-.004	-.137**	-.056	.028	-.174**	-.023	-.046	.028	1	.159**	-.002	.094*	-.034	-.112*	-.035	.014	-.065	-.103*	-.112*	-.049	.002	-.004	-.070	.038	.132**
	Sig. (2-tailed)	.936	.003	.233	.553	.000	.630	.327	.546		.001	.970	.044	.468	.016	.450	.759	.163	.028	.016	.296	.973	.927	.135	.414	.005
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CFlex	Pearson Correlation	.095*	.215**	.137**	.206**	.108*	.000	.106*	-.011	.159**	1	.024	.046	.052	.049	-.001	.235**	.024	.102*	.031	.036	.010	.026	-.053	.052	.009
	Sig. (2-tailed)	.042	.000	.003	.000	.021	.998	.024	.823	.001		.609	.326	.263	.297	.978	.000	.612	.030	.511	.439	.833	.583	.262	.268	.846
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CTrai	Pearson Correlation	.140**	.207**	.137**	.142**	.139**	.052	.131**	.241**	-.002	.024	1	.104*	.164**	.154**	.164**	.055	.106*	.234**	.211**	.244**	.065	.150**	.106*	.027	.070
	Sig. (2-tailed)	.003	.000	.003	.002	.003	.270	.005	.000	.970	.609		.026	.000	.001	.000	.236	.023	.000	.000	.000	.164	.001	.023	.565	.133
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CAccu	Pearson Correlation	.195**	.069	.336**	.323**	.258**	-.027	.208**	.323**	.094*	.046	.104*	1	.311**	.279**	.153**	-.077	.164**	.249**	.157**	.243**	-.007	.296**	.126**	.163**	.156**
	Sig. (2-tailed)	.000	.138	.000	.000	.000	.566	.000	.000	.044	.326	.026		.000	.000	.001	.102	.000	.000	.001	.000	.875	.000	.007	.000	.001
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CComp	Pearson Correlation	.583**	.415**	.661**	.433**	.404**	.098*	.599**	.484**	-.034	.052	.164**	.311**	1	.239**	.253**	.193**	.276**	.662**	.550**	.564**	.029	.263**	.075	.350**	.265**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.037	.000	.000	.468	.263	.000	.000		.000	.000	.000	.000	.000	.000	.000	.531	.000	.111	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CCurr	Pearson Correlation	.109*	.271**	.140**	.274**	.216**	.080	.243**	.244**	-.112*	.049	.154**	.279**	.239**	1	.369**	.119*	.084	.347**	.159**	.100*	.018	-.100*	.025	-.069	.126**
	Sig. (2-tailed)	.020	.000	.003	.000	.000	.086	.000	.000	.016	.297	.001	.000	.000		.000	.011	.074	.000	.001	.033	.696	.033	.589	.140	.007
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CRD	Pearson Correlation	.143**	.159**	.192**	.148**	.159**	.051	.186**	.240**	-.035	-.001	.164**	.153**	.253**	.369**	1	.131**	.193**	.352**	.220**	.140**	.096*	.028	.139**	.134**	.080
	Sig. (2-tailed)	.002	.001	.000	.002	.001	.272	.000	.000	.450	.978	.000	.001	.000	.000		.005	.000	.000	.000	.003	.040	.544	.003	.004	.088
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CLC	Pearson Correlation	.220**	.283**	.229**	.005	.071	.000	.196**	.046	.014	.235**	.055	-.077	.193**	.119*	.131**	1	-.017	.138**	.223**	.213**	.047	-.042	.034	.106*	.151**
	Sig. (2-tailed)	.000	.000	.000	.911	.132	.993	.000	.331	.759	.000	.236	.102	.000	.011	.005		.719	.003	.000	.000	.318	.365	.464	.024	.001
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CTime	Pearson Correlation	.242**	.133**	.351**	.265**	.194**	.023	.251**	.302**	-.065	.024	.106*	.164**	.276**	.084	.193**	-.017	1	.313**	.351**	.316**	.060	.194**	.094*	.199**	.061
	Sig. (2-tailed)	.000	.004	.000	.000	.000	.625	.000	.000	.163	.612	.023	.000	.000	.074	.000	.719		.000	.000	.000	.198	.000	.044	.000	.196
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CCont	Pearson Correlation	.612**	.477**	.612**	.395**	.573**	.031	.573**	.623**	-.103*	.102*	.234**	.249**	.662**	.347**	.352**	.138**	.313**	1	.685**	.600**	.052	.268**	.205**	.417**	.223**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.504	.000	.000	.028	.030	.000	.000	.000	.000	.000	.003	.000		.000	.000	.268	.000	.000	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CForm	Pearson Correlation	.562**	.383**	.568**	.302**	.292**	.064	.544**	.455**	-.112*	.031	.211**	.157**	.550**	.159**	.220**	.223**	.351**	.685**	1	.615**	.043	.319**	.119*	.540**	.237**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.173	.000	.000	.016	.511	.000	.001	.000	.001	.000	.000	.000	.000		.000	.355	.000	.011	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CReli	Pearson Correlation	.552**	.399**	.574**	.198**	.430**	.058	.476**	.608**	-.049	.036	.244**	.243**	.564**	.100*	.140**	.213**	.316**	.600**	.615**	1	.079	.521**	.131**	.346**	.288**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.216	.000	.000	.296	.439	.000	.000	.000	.033	.003	.000	.000	.000	.000		.093	.000	.005	.000	.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CResp	Pearson Correlation	-.034	-.074	.014	.000	-.027	.029	-.022	.121**	.002	.010	.065	-.007	.029	.018	.096*	.047	.060	.052	.043	.079	1	.090	.085	-.038	-.064
	Sig. (2-tailed)	.464	.113	.762	.995	.565	.537	.641	.010	.973	.833	.164	.875	.531	.696	.040	.318	.198	.268	.355	.093		.055	.070	.422	.173
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CAssu	Pearson Correlation	.263**	.158**	.388**	.057	.211**	.085	.141**	.375**	-.004	.026	.150**	.296**	.263**	-.100*	.028	-.042	.194**	.268**	.319**	.521**	.090	1	.107*	.218**	.090
	Sig. (2-tailed)	.000	.001	.000	.222	.000	.068	.003	.000	.927	.583	.001	.000	.000	.033	.544	.365	.000	.000	.000	.000	.055		.022	.000	.055
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CEmpa	Pearson Correlation	.059	-.024	.121**	.053	.093*	.001	.125**	.078	-.070	-.053	.106*	.126**	.075	.025	.139**	.034	.094*	.205**	.119*	.131**	.085	.107*	1	.064	.073
	Sig. (2-tailed)	.210	.604	.010	.260	.047	.985	.008	.096	.135	.262	.023	.007	.111	.589	.003	.464	.044	.000	.011	.005	.070	.022		.173	.118
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
CTang	Pearson Correlation	.350**	.133**	.317**	.178**	.262**	.008	.354**	.368**	.038	.052	.027	.163**	.350**	-.069	.134**	.106*	.199**	.417**	.540**	.346**	-.038	.218**	.064	1	.163**
	Sig. (2-tailed)	.000	.004	.000	.000	.000	.870	.000	.000	.414	.268	.565	.000	.000	.140	.004	.024	.000	.000	.000	.000	.422	.000	.173		.000
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457
System Awareness	Pearson Correlation	.354**	.181**	.167**	.157**	.163**	.046	.348**	.240**	.132**	.009	.070	.156**	.265**	.126**	.080	.151**	.061	.223**	.237**	.288**	-.064	.090	.073	.163**	1
	Sig. (2-tailed)	.000	.000	.000	.001	.000	.329	.000	.000	.005	.846	.133	.001	.000	.007	.088	.001	.196	.000	.000	.000	.173	.055	.118	.000	
	N	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457	457

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

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

Appendix 4: Descriptive Analysis of the Respondents' Responses Regarding the IVs.

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Ease of Use 1	457	1.00	5.00	2.1532	1.18588
Ease of Use 2	457	1.00	5.00	2.0591	1.10164
Ease of Use 3	457	1.00	5.00	2.0919	1.07620
Ease of Use 4	457	1.00	5.00	1.9978	1.01631
Accessibility 1	457	1.00	4.00	1.9562	.81263
Accessibility 2	457	1.00	4.00	2.0503	.86836
Accessibility 3	457	1.00	4.00	1.9803	.74165
Assistance 1	457	1.00	5.00	2.6193	1.12561
Assistance 2	457	1.00	5.00	2.7243	1.10547
Authorisation 1	457	1.00	5.00	2.9584	1.14919
Authorisation 2	457	1.00	5.00	3.1488	1.21023
Flexibility 1	457	1.00	5.00	2.5667	1.19044
Flexibility 2	457	1.00	5.00	2.6171	1.08214
Training 1	457	1.00	5.00	3.5886	1.08888
Training 2	457	1.00	5.00	3.4814	1.08427
Training 3	457	1.00	5.00	3.4880	1.36705
Accuracy 1	457	1.00	5.00	2.2976	.87550
Accuracy 2	457	1.00	5.00	2.2888	.95038
Compatibility 1	457	1.00	5.00	2.0066	.84680
Compatibility 2	457	1.00	5.00	2.2538	.90872
Compatibility 3	457	1.00	5.00	2.2495	.92429
Compatibility 4	457	1.00	5.00	2.1291	.81297
Currency 1	457	1.00	5.00	2.6871	.95543
Currency 2	457	1.00	5.00	3.2495	.99952
Currency 3	457	1.00	5.00	2.8884	1.01232
Right Data 1	457	1.00	5.00	3.5055	1.00681
Right Data 2	457	1.00	5.00	3.0503	1.17152
Right Data 3	457	1.00	5.00	3.5558	1.05634
Lack of Confusion 1	457	1.00	5.00	2.6740	1.09466
Lack of Confusion 2	457	1.00	5.00	2.9453	1.18805
Timeliness 1	457	1.00	5.00	2.4092	1.01359
Timeliness 2	457	1.00	5.00	2.2429	1.06173
Timeliness 3	457	1.00	5.00	2.3851	1.06192
Timeliness 4	457	1.00	5.00	2.4048	1.11224
Content 1	457	1.00	4.00	2.1707	.79567
Content 2	457	1.00	5.00	2.3304	.85469
Content 3	457	1.00	5.00	2.4683	.96631
Content 4	457	1.00	5.00	2.4420	.89187
Format 1	457	1.00	5.00	2.4551	1.02740
Format 2	457	1.00	5.00	2.2363	.85131

Format 3	457	1.00	5.00	2.1444	.83044
Reliability 1	457	1.00	5.00	2.4617	.99514
Reliability 2	457	1.00	5.00	2.4989	1.07018
Reliability 3	457	1.00	5.00	2.1882	.81625
Reliability 4	457	1.00	5.00	2.2604	.84294
Reliability 5	457	1.00	5.00	2.1729	.81830
Responsiveness 1	457	1.00	5.00	2.5821	1.29369
Responsiveness 2	457	1.00	5.00	2.6608	1.40052
Responsiveness 3	457	1.00	5.00	2.5624	1.32492
Responsiveness 4	457	1.00	5.00	2.6455	1.31337
Assurance 1	457	1.00	5.00	2.2079	.93571
Assurance 2	457	1.00	5.00	2.1816	.91518
Assurance 3	457	1.00	5.00	2.3742	.95859
Empathy 1	457	1.00	5.00	2.2516	1.28764
Empathy 2	457	1.00	5.00	2.0328	1.20535
Empathy 3	457	1.00	5.00	2.3151	1.07465
Empathy 4	457	1.00	5.00	2.1247	.99548
Tangible 1	457	1.00	5.00	2.4201	1.02098
Tangible 2	457	1.00	5.00	2.6193	1.15066
Tangible 3	457	1.00	5.00	2.5777	1.17866
Tangible 4	457	1.00	5.00	2.3961	.92399
Valid N (listwise)	457				