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Evaluating the Performance of Academic and Student Administration System in its Post-implementation Phase: A Case Study at the University of Botswana

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Dissertation submitted in partial fulfilment of the requirements for the degree of Master of Business Administration

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September 2017

Statement of Declaration

The work contained in this dissertation was carried out by the author at the University of Botswana between May 2016 and September 2017. It is original work except where due reference has been made and neither it has been nor will be submitted for the award of any other University.

Signed: ………………………….

Date: ………………………….

Acknowledgements

My thanks and appreciation go to my Supervisors Messrs Rudolph Boy and Rebana N. Mmereki who have generously given their time and expertise to better my work, and to complete this research. Working with them was one of the most important and formative experiences in my life.

Further, I am grateful,

(i) first of all, to the Almighty God for enabling me complete this study in my sixties;

(ii) to those who responded to my online questionnaire survey, and the interviewees who shared their ASAS experiences with me, without which this project would not have been possible;

(iii) to the Director of GSB, Prof. J. Pansiri for his good-natured support;

(iv) to the University of Botswana for supporting me in this academic endeavour; and

(v) to my family for their constant support without complaints even when I had often failed in my household obligations.

Dedication

I dedicate this dissertation work to my late parents and family that comprises two daughters, two sons, and their spouses and kids.

Abstract

In the year 2012, the University of Botswana (UB) replaced its 20-year old management information system called Integrated Tertiary System (ITS) with a more robust ERP System to improve management, administration and customer services. However, according to the literature, not all ERP system implementations have been successful for various challenges that organisations often encounter in its implementation process. Specific to the UB context, the researcher has taken note of challenges faced by both instructors and students particularly in the beginning and end of every semester. Therefore, it is essential to evaluate whether the ERP System in UB is performing successfully in its post-implementation phase up to the expectations of its end-users. However, due to time constraints, this study focussed only on its Academic and Student Administration System (ASAS) module which is just one of its modules. The study investigated end-user perceptions of the performance of the UB ASAS in its post-implementation phase, and made an attempt to identify any factors that might have had direct or indirect influence on the perceptions of its end-users. The study was guided by the DeLone and Mclean Information System (IS) success evaluation model. Three independent but inter-related ASAS quality dimensions and one dependent variable (user satisfaction) were included in the model. The study used qualitative methods as the major along with some quantitative approaches that used a questionnaire and statistical tools such as reliability test of Cronbach's Alpha, descriptive statistics, and paired samples t-test. The study found that: (i) users were satisfied with the ASAS performance; however, they felt that there was still room for improvement; (ii) there were factors that influenced user perceptions of ASAS performance; they were identified; recommendations were made on how to address them for improving system performance and hence, user satisfaction. Despite a few limitations, the study provided significant theoretical and practical contributions to the field related to the evaluation of post-implementation success of information systems. Therefore, this study is unique and to some extent, it served the purpose of reducing the knowledge gap in this area.

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Glossary/List of Acronyms

ASAS (Academic and Student Administration System): A sub-system of the UB ERP System**.** It provides a range of online self-services to both students and instructors.

End-User: A person or an organization that normally uses a product. For the purpose of this study, students and their instructors are the end-users. They input operational data in the System and rely on the output information for decision-making.

ERP (Enterprise Resource Planning) System: It is a suit of multi-modular business process management software that allows an organizations to use a system of integrated applications to manage and automate their business and office functions. Each ERP module is focused on one area of business processes.

Go-live: With the "go-live" in the lifecycle of an ERP System, the project becomes operational for the first time, after all the tests on it at implementation level have been completed.

Information Quality: It is concerned with the timeliness, accuracy, and relevance of the Information.

Perceived System Performance: It refers to how a user *thinks* of the performance of a system.

Post-implementation Phase (PIP): It focuses on the phase immediately following go-live when the ERP System becomes accessible by users for live, day-to-day operations.

Service Quality: It is the quality of support that systems users received from the technical support personnel.

System Performance: It refers to the total effectiveness of a computer system, including throughput (rate of processing work), individual response time, and availability.

System Quality: It is concerned with reliability, correctness, and consistency of the System.

System Satisfaction: It is the attitude of a **user** to the system in the context of his/her work environments. It is measured by the extent to which the user believes that the system meets his/her job-related needs.

CHAPTER 1: INTRODUCTION

1.1 An Overview

In a constantly changing global business environment, it is critical for organisations to continually expand their business processes and sharpen their competitive edge. Towards achieving this goal, an increasing number of organizations are deploying a computing platform called Enterprise Resource Planning (ERP) System which has various advanced information processing capabilities. Often the ERP System replaced their aging systems for making business processes more efficient and increasing the level of automation. University of Botswana (UB) is no exception. UB deployed ERP System in 2012 to replace its 20-year old management information system (IS) called Integrated Tertiary System (ITS).

Although the use of ERP System can bring competitive advantage to organisations, extant literature ((eg., Ala'a and Heeks, 2010; Chen et al., 2013; Dey et al., 2013) indicates that its implementation can be a challenging endeavour due to its complex nature. There are numerous occurrences of high failure rate or situations of not being able to tap its full potential due to numerous technical, managerial, and organizational challenges. Specific to the UB context, the researcher has taken note of certain challenges faced by both instructors and students particularly in the beginning and end of every semester; their concerns include system unavailability when it is most wanted, poor system response rate and the like. Hence there was a dire need to evaluate the recently deployed ERP System in UB, in order to understand whether it was performing successfully as expected, and if not, to identify the challenges and propose recommendations to address those challenges; and hence the main purpose of this study.

1.2   What is ERP System?

ERP is the acronym for "Enterprise Resource Planning". ERP System is a complex and comprehensive software package designed to integrate business processes and functions for enhancing user productivity and organisational benefits (Chen and Lin, 2008). Originally conceived as an Inventory Management and Control application in the 1960s, the system evolved through several forms into the current ERP System in the 1990s and became very popular in large industrial and corporate sectors, and later in the higher education sector around the world (Noaman & Ahmed, 2015). Several scholars (eg., Levi and Doron, 2013; Tsai et al., 2010) claim that despite the complex nature of ERP Systems and huge investments required for deploying it, organizations consider it to be a vibrant tool for cost effectiveness, improved operations across the enterprise, and overall business success. Today it is one of the most popular and widely accepted business management system deployed in a wide variety of large industries and organizations globally to achieve competitive advantage in their business.

The ERP System is a multi-modular computer tool that integrates several business functions of an organization like manufacturing, financials, supply chain management, projects, human resources, customer relationship management and data warehouse into one single manageable Information System (Markus et al., 2000). Being modular in nature, ERP System has an open system network architecture; as a result, it allows new module(s) to be linked to or any redundant module to be de-linked from the system without affecting other modules, making the system scalable and customizable as and when required to match with the changing needs of an organisation. Thus, organisations can add new modules as they grow.

In essence the ERP software architecture can envelop a broad range of enterprise wide functions and integrate them into a single unified database repository as a centralized storage. As a whole, ERP System helps to integrate business processes of individual departments and manage all

functions and resources into a single computer application, enable better/ faster collaboration across all the departments, support decision making in real time, facilitate automatic and single reporting approach, and enable organisations to become more productive and efficient in their business. With legacy systems prior to the use of modern ERP Systems, each department in an organisation had its own software application which did not interface or link with any other department. Such isolated frameworks and lack of synchronization caused delays in inter-departmental communication and hence, decision making which in turn adversely affected productivity, speed and performance of the overall organization. ERP System builds strong capabilities, improves performance, supports better decision making, and provides competitive advantage for businesses (Ahmed et al., 2006). It impacts the entire operations, both internal and external, of an organization. It is often considered an organization's most strategic computing platform and a vital element in organizational infrastructure for enhanced visibility and improved performance.

ERP System is in fact a large-scale complex Information System (IS) and therefore, references made to ERP in this study are equally applicable to any complex IS and vice versa. ERP Systems have been found to have conceptual links with almost every area of information system research (Markus and Tanis, 1999). The ERP System is normally well secured and all the transactions happening via the systems can be tracked. It can be accessed only by authentic users often over a Local area network (LAN), thus protecting the reliability and security of the database.

1.2.1 *ERP System in Higher Education*

Since the dawn of this century, an increasing number of higher education (HE) institutions around the world is deploying ERP System to improve their core administrative and academic service delivery, and to serve their stakeholders more efficiently than ever before. ERP System

has played a significant role in the IT management of higher education institutions during the last two decades on the academic, management, financial and administrative levels due to its potential for increasing productivity, real-time capabilities and seamless communication (Noaman & Ahmed, 2015).

Deploying a comprehensive ERP System in HE institutions leads to many benefits such as (Kushwaha, 2015; Khare, 2014; Seo, 2013; Abugabah & Sanzogni, 2010):

- Improved services for the faculty, students, and employees,

- The capability to streamline different organizational processes and workflows, and hence, achieving workflow synchronization,

- The ability for easy information exchange across various departments in real time,

- Enhanced tracking, forecasting, and decision making,

- Increased customer response time, customer service and satisfaction,

- Reduced use of paper,

- Budget and plan programs and resources more efficiently,

- Streamline course selection process and give students greater control to reach their education goals,

- Manage timely, accurate registration, real-time course checking, automated room monitoring, wait listing, and walk-ins,

- Grant instructors anytime, anywhere access to class lists, student schedules, and grading,

- Plan and organize curricula to offer the right courses at the right time,

- User-friendly, Web-based interfaces,

- A perfectly integrated system linking all the functional areas together,

- Improved efficiency, performance and productivity levels across the entire organisation.

However, generic ERP Systems available off-the-shelf have been developed with industry standards and best practices in mind, and are not be fully compatible with the structure and processes of academic environments. Therefore, ERP software required customisation for a given HE institution to meet its specific academic and related functionalities and needs.

1.2.2 *Deployment of ERP System at the University of Botswana*

ERP System project was launched at the University of Botswana (UB) in 2012 to replace its legacy ITS (iERP Newsletter, January 2013). At UB, it is popularly known as iERP which stands for **i**ntegrated **E**nterprise **R**esource **P**lanning System project (iERP Project-Stakeholder e-Newsletter, April, 2012). Gone live in the first half of 2013, the UB iERP project was officially commissioned in October 2013. The core elements of the iERP package comprises the following sub-systems/ Modules and functions (iERP Project-Stakeholder e-Newsletter, April, 2012).

Table 1: ERP Sub Systems and Functions

iERP Modules	Functions
Time Tabling (TT)	- Creating and maintaining time tables; it enables users to view timetables on-line.
Residence Management System (RMS)	- Ensures that stakeholders are allocated rooms that suite the diverse requirements of different functions and events.
Academic & Student Administration System (ASAS)	- A self-service function enables the users to access most of the information on-line. - Addresses a broad range of academic needs which include, but is not limited to handling student applications and admissions, advisement, student academic performance and student finances.

Payroll	- Administers the important function of paying salaries and wages to the university's committed staff. Self –service offers on-line viewing of pay slips.
Human Resources Management System (HRMS)	- Meets the human resource management challenges within the competitive academic marketplace. - Offers o-line application of leave.
Financial Management System (FMS)	- FMS enables the university to meet current and future reporting targets set by regulatory and other stakeholders.
Business Intelligence (BI)	- An analytics function that summarizes information from all the systems. - Used by Executives uncover business trends and make strategic decisions.
Document Management and Imaging System (DMIS)	- Manages information that is currently stored in paper based filing systems. - Converts paper based data to electronic form and manages it together with files from spreadsheets and word processing systems.

Source: iERP Project-Stakeholder e-Newsletter (April, 2012)

These modules were released one after the other at different times even before its official commissioning; first to go-live was the Human Resource Management System (HRMS), followed by Payroll and then FMS. There were technical reasons for scheduling the go-live dates in this sequence, and it is beyond the scope of this study (iERP Newsletter, January 2013).

Each ERP software module mimics a major functional area of UB. Being modular in structure, new modules may be simply plugged into the main ERP System without actually re-organising the main system when new business features or services are required. This resulted in the emergence of numerous new specialised ERP System modules in the market, such as finance/ accounts, human resources, project management, inventory management,

supply chain planning, supplier scheduling, claim processing, sales order administration, procurement planning, and logistics as applicable to HEIs. Among the modules described above, only the Academic and Student Administration System (ASAS) is under the lens for this study, and it is further described below.

1.3 The Academic and Student Administration System (ASAS)

The Student Administration System or the Academic and Student Academic System (ASAS) as it is popularly known in UB provides a range of online self-services and support to students, instructors, faculty administrators and the Management. The self-service function enables users have access to information online that is relevant to them individually. ASAS is a huge software system; it has the following sub-systems as it is used in UB: Academic Advisement, Student Records Administration and Gradebook and are described below.

Table 2: ASAS elements and their functions

Academic Advisement	Students can view all academic requirements, and courses that can be taken to satisfy their educational needs	
	Students can view programmes and select courses/ classes	
Student Records Administration	Online recruiting, application processing and automated admissions	
	Online registration (Enrolment)	

	Automated transcripts
	   - Online ordering
	   - Multiple destination delivery
	   - Automatic production scheduling	

Gradebook	Activity and progress	
	Continuous assessment	
	Grading scales	
	Weighting of assessment components and GPA calculation	
	Progression rules enforced	

There are other sub-systems that are integrated to the ERP System and operate hand-in-hand with ASAS. They are Student Financials, Time Table, Campus Self Service (Portal), and Residential Management.

Student Financials	Calculates tuition fees based on academic load or anticipated load (link credits & payments).
	Automatically calculates changes in a student's tuition from a dropped or added class.
	Calculates tuition for course with student-specific start and end dates.
	Automatically transfers charges to credit the student account.
	Reverses sponsor credits to the student's account if the sponsor declines to pay for a students or is delinquent.
Campus Self Service (Portals)	Students can access all the information required to manage campus life, academics, financial transactions, and collaborate with other students, academics, advisors and staff.
	Students can view and analyse academic progress, plan courses and directly enrol in courses as they become available.
	Staff members can see class schedules and locations and dynamically update schedules and post grades.
	Staff members can instantly connect to one or all of their students by email.
	Online directories and access to personal profiles- students, academics, and other staff can update their own personal profiles and data online.
Timetable	Generate teaching time table linked to space.
	Generate exam time table and allocate invigilators.
	Integrated with online communication services (Staff can send email to one or more students in the scheduled lesson).
Residential Management	Planning
	Self service application - Select roommate - Request maintenance
	Automated allocation

ASAS is also expected to be linked with existing applications such as Innopac Library System, Research management Systems, Performance Management Systems, Access Control Systems and Learning Management Systems (LMS). ASAS and associated sub-systems facilitate improved services for instructors and students. Specifically, it helps instructors access class lists, class schedules, and student grads anytime, from anywhere.

Specific benefits to students are:

- Online registration/ enrolment, real-time course checking, automated room monitoring, wait listing, etc;

- Greater control to add or drop courses in line with their education goals

- Download and print confirmation of their programme and course registration,

- Viewing details of their financial matters such as fee payments, dues, etc

- Printing of teaching timetable,

- Viewing examination, test and continuous assessment (CA) results, and

- Download and print transcripts, anytime from anywhere.

Overall ASAS is expected to overcome shortcomings of the previous ITS and to play a significant role in providing competitive advantages to UB.

1.4   Problem Statement

ERP System is a large and costly investment of human and financial resources with huge benefits; as a result, it is natural for end-users and the organisation's management to expect greater productivity and more efficient service delivery than ever before. However, literature indicates (eg., Ala'a and Heeks, 2010; Chen et al., 2013; Dey et al., 2013) that unexpected challenges with ERP System implementation (eg., difficulty in merging databases of the old and new systems, and re-training employees to use the new system) are very common, and in practice, it can cause performance issues in the go-live stage, and even beyond. Several scholars

(eg., Stewart, 2013; Dey et al., 2013) have noted that despite widespread adoption of ERP only a minority of organisations are able to reap their full benefits. ERP System implementation failures can be financially devastating for any organization whilst its successful implementation can provide significant organizational benefits.

The researcher has taken note of certain concerns expressed by both instructors and students particularly in the beginning and end of every semester; their challenges include system unavailability when it is most wanted, poor system response rate and the like. Having spent millions of Pula by UB on the newly introduced ERP/ ASAS, it is critical to review the performance of the system in its post-implementation phase in order to identify any potential challenges such as any bugs or any flaws that went unnoticed during the implementation stage, and to address them strategically as early as possible in order to improve return of investments. Thus, this is basically an evaluation study. Finney and Corbett (2007) have argued, a project is not even complete without post-implementation evaluation. The literature indicates that many ERP System implementations failed to achieve the organisation's targets and expectation due to lack of timely evaluations. Post-implementation reviews could help outline causes of project failure, improve system functionality and provide guidelines for future success. Therefore, it becomes beneficial to evaluate the success of such systems, considering that investing hugely in IT projects does not necessarily guarantee success (Aggelidis & Chatzoglou, 2012).

The end-users are the ones who directly interact with the system on a daily basis, and therefore, their perceptions on the system performance and other related concerns have a direct bearing on the system performance and success. As a result, the need to identify areas of user satisfaction as well as dissatisfaction with the system is becoming increasingly essential when huge systems such as ERP/ ASAS are deployed. At UB, the iERP/ASAS system is now in the fourth year of its post-implementation phase. As far as this researcher knows, no formal

evaluation of the System has ever been undertaken. Therefore, this study fills that void. Therefore, this work is basically an evaluation study; the overarching research problem is to investigate whether the UB ASAS is successfully performing in its post-implementation phase or there is a gap between promised and realised benefits, and to provide suggestions to fill up the gap(s) if any based on the literatures and participant responses.

1.5   Aims and Objectives

The aim of this study was to investigate whether the UB ASAS was successfully performing in its post-implementation phase using appropriate research methodologies. The extant literature indicates that success of an IScannot be easily evaluated directly due to its complex and multi-dimensional nature and the difficulty in defining it. Scholars are of the view that the end-user satisfaction can be accepted as an indicator of the successful performance of any IS in their post-implementation phase. Thus the study aims to examine whether the end-users are satisfied with the system performance, and to identify any contextual factors that might have impacted the performance. The research objectives are:

(i) To investigate end-user perceptions of the performance of UB ASAS in its post-implementation phase; and

(ii) To identify any factors that might have had direct or indirect influence on the perceptions of end-users of UB ASAS in its post-implementation phase.

DeLone and McLean's (1992, 2003, 2004) IS success evaluation model is widely cited and commonly-used in IS success evaluation studies. According to them, the three IS quality dimensions- system quality, information quality and service quality- are inter-dependent and are essential to achieve success in any IS post-implementation phase. These quality constructs are multidimensional attributes. It is important to determine what aspects of these are critical in the UB context in order to devise effective quality improvement strategies, and to allocate

scarce resources where it is needed most. The model and its dimensions are discussed in detail in Chapter 2: Literature Review.

By the term 'organisational factors', the researcher meant possible mediating or confounding variables specific to UB context. The type and nature of these variables can be different from one institution to another.

1.6 Research Questions

The overarching research questions to achieve the above objectives are:

(i) How do end-users of UB ASAS perceive the system performance in its post-implementation phase?

(ii) What are the factors that might have had direct or indirect influence on the perceptions of end-users of UB ASAS in its post-implementation phase?

1.7 Significance of the Study

The study has provided initial insights on a topic previously unexplored in the Botswana context. Therefore, this study is unique, and it makes significant theoretical and practical contributions to the field related to the evaluation of post-implementation success of ISs. To some extent, it served the purpose of reducing the knowledge gap in this area.

Based on the outcome of the study, the ERP System managers in UB can assess the realised payoffs against their original expectations and can pay sufficient attention any weakness identified by the end-users. It will also help the allocate scares resources where it is most needed.

Insights from this study could help practitioners, academics and entrepreneurs to plan and develop good strategies to tap the full potential of ERP Systems in their organisations. It could also be useful to other organisations that intend to adopt ERP Systems. As ERP Systems continue to spread widely in HE, the need for new research of this kind is highly essential. The adapted model used in this study could be useful for future research on the same or related topic by other researchers with appropriate modifications.

1.8   An Overview of the Research Methodology and Design

Research methodology relates to the theory underpinning the research and it enables researchers to design the study processes. The researcher employed a case study approach which is one of the most frequently used methodologies for exploring phenomena within their natural context (Yin, 2009). Case studies are usually performed on an individual or small group of individuals or an organisation. It can take either a qualitative or a quantitative approach. Case studies enable researchers to gather rich and robust data representing actual experiences of the subjects, and to interpret and understand subjects' experiences with a view to finding ways to improve those experiences in future.

This research was conducted using qualitative approaches backed by quantitative methods for data collection. The study utilised a structured questionnaire and semi-structured interviews within a qualitative case study framework for data collection. Qualitative method was used to get a deeper understanding of the meanings that users attached to the numerical responses in the quantitative survey (Merriam, 2009). Semi-structured interviews helped to better understand the questionnaire outcome and also, to probe into the possible factors that might have contributed towards the success and failures of the system. More details are provided under section 3.5.1. T-Test and content analysis methods were used to analyse the quantitative and qualitative data respectively.

1.8.1 Research Population and Sample

The research population comprised all students (about 20000) and academic staff (about 1000) of UB. All of them were given opportunity to participate in a web-based questionnaire survey. However, only 17 instructors and 43 students completed the questionnaire despite a two reminders in a gap of two weeks. Thus there were only a total of 60 participants in the sample for descriptive statistics.

For the qualitative component of the study, the researcher initially hoped to do a purposive sampling based on the outcome of the web-based questionnaire responses that required respondents' readiness to participate in the interview, and an indication from the responses if they were representative of the whole population (eg., if one left several questions unanswered, that respondent could not be considered as part of the sample). However, the use of web-based questionnaire approach for selecting the purposive sample did not work out as a result of poor response rate by subjects. As an alternative, a convenience sampling was carefully done whereby only the 'right subjects' who could provide meaningful responses/ data appropriate for the study were selected (based on researcher's knowledge and professional judgment of their background, and their willingness to participate in the study). Subsequently, the criterion of 'data saturation' (Mason, 2010; Bowen, 2008) was applied during interviews; that is, interviewing new participants continued until no fresh information was forthcoming. More details are provided in section 3.6.

1.9   Philosophical Underpinning of the Study

All research is based on some underlying philosophical assumptions by the researcher about what constitutes 'valid' knowledge about a phenomenon. The underlying epistemological approaches of this research is Pragmatism which lies within a Positivist-Interpretivist continuum. It allows both deductive and inductive methods associated with quantitative and

qualitative research approaches. However, as this study is more about interpreting end-user perceptions on ASAS performance (the phenomenon being studied), interpretive orientation is an important element of the study. Philosophical paradigms and the rationale for choosing Pragmatism as the basis of the study are further discussed in Section 3.3.1

1.10   Trustworthiness of the Study

Issues of reliability and validity can be assessed in a relatively straightforward manner in quantitative studies which are often based on standardized instruments. However, these criteria cannot be strictly applied to the qualitative studies whereby the researcher is interested in questioning and understanding the meaning and interpretation of phenomena. Merriam (2009) posits that a debate is raging because the constructs of reliability and validity are quantitative and positivist, and not necessarily that applicable to qualitative research (p. 199). Assessing the accuracy and confirming the merit of qualitative findings are not easy.

However, some scholars have proposed several possible strategies and criteria that can be used to enhance the trustworthiness or rigour of qualitative studies. For example, Guba (1981) proposes four criteria that he believes should be considered by qualitative researchers in establishing the trustworthiness of a qualitative study. These criteria focus on credibility, transferability, dependability and confirmability. Qualitative researchers are required to apply these strategies and criteria appropriately because it is essential for other researchers to evaluate the methodological rigor of the study and confirm the merit of the study. Strategies for ensuring rigor in the study are discussed in greater detail in Section 3.8.

1.11   Limitations and Delimitations of the Study

Limitations are potential weaknesses or constraints in a study and are out of researcher's control. It can sometimes affect the research design, methods of data collection and analysis,

thus limiting the opportunity for researchers to make detailed investigations in their subject areas and for drawing accurate conclusions. The researcher must make the limitations clearly known to the readers, and explain how they dealt with them so that other researchers may attempt to overcome them in their future studies. Also limitations of the present study may as well be directions for future research.

Response to the online questionnaire survey was relatively low compare to the target population. However, it was addressed by using a dependable convenience sample and the criterion of 'data saturation' (Mason, 2010; Bowen, 2008) as discussed earlier in Section 3.6. By this change in strategy, more emphasis was put on the qualitative component than on the quantitative outcome (since the questionnaire response was low).

Further, an important assumption made in the study was that the research participants provided open, honest, and complete responses about their ASAS experiences without any prejudices or biases; self-reported measures have their obvious limitations. These and other limitations specific to this study are further discussed in Section 3.14.

Delimitation refers to the scope of a study which in turn is an indication of the constraints set by the researcher before starting the study based on the context. They limit the scope of a study. The researcher has delimited the scope of this study to only the ASAS module of the ERP System due to time constraints. This delimitation is justifiable as the main stakeholders of UB are students and their instructions, and the system they use is ASAS. This research limits its scope only to a context where the use of ASAS is mandatory and there are no alternative systems. Application of findings from this study should only cautiously be applied to other situations that are operating under their own unique contexts.

1.12   Ethical Considerations

Confidentiality and anonymity were assured to all participants. All data were stored in a secured computer of the researcher. Identity of participants was disguised, as were their other personal details and views. Ethical clearance and Research Permit to conduct the study were obtained from the Office of Research and Development Unit, and the Management of UB respectively. Consent was obtained from all participants. Right from the onset, the participants were made fully aware that the participation in this study was voluntary and they could decide to pull out any time without any obligations or pressure from the researcher.

1.13   Chapter division

Chapter 1 introduces the research, outlining the background to ERP Systems, their major components and their use in HE with reference to UB context. It sets out the statement of the problem, objectives, research questions and significance of the research and outlines the methodology.

Chapter 2 assesses relevant literature covering ERP Systems in their post-implementation phase particularly in the HE context. The literature review identifies and discusses in detail the most cited and popular Delone and Mclean IS success evaluation model which is identified as the best model to be adopted for this study. Delone and Mclean model was adapted to develop a framework for the study. Variables of this model and their related attributes were used to develop research instruments for the study.

Chapter 3 discusses the research methodology, describing and discussing the research process that include design of the study, data collection and analysis procedures.

Chapter 4 reports the analysis of the data collected from the quantitative (questionnaire), and qualitative methods (interviews). The two results are then compared/ triangulated to draw the final conclusion.

Chapter 5 summarises the research processes and discusses the research findings. Further, based on findings, the chapter presents implications for practice along with recommendations,

study's contribution to the field, and offers recommendations for future research before concluding the chapter.

1.14   Chapter Summary

This chapter introduces the basic tenets and discusses the context of the study. It sets out the statement of the problem, objectives, research questions and significance of the research and outlines the methodology of this research endeavour. It emphasises the significance of such a study along with its potential contribution, and finishes with an outline of the chapter.

CHAPTER 2: REVIEW OF RELATED LITERATURE

2.1   An Overview

The previous chapter introduced the basic tenets and discusses the context of the study. This chapter provides a review of the literature in relation to this study. The literature indicates that, despite ERP Systems' complexity coupled with possibility of several implementation challenges, and huge cost implications, an increasing number of HEIs around the world are now investing heavily in the deployment of ERP System for enhanced capabilities, better customer service and improved performance.

The review was directed towards identifying relevant IS models that defined system success and factors that contributed towards system success. In the process, it was noted that the DeLone and McLean (D&M) success evaluation model was the most-cited and commonly-used success evaluation model in the IS literature; it is built up on six distinct, yet inter-dependent dimensions of IS success and is the most appropriate model relevant to this study. A conceptual framework and a model for this study were drawn mainly from the D&M model through appropriate modifications to suit the UB context. The use of the constructs called 'dimensions' in the D&M model helped to identity strengths and weaknesses of the ASAS system which were critical to the successful deployment of the ERP System.

2.2   Introduction to the Literature Review

Although the literature discussed in the following sections throws light on numerous studies on ERP Systempost-implementation performance conducted in corporate sectors around the world, there is a dearth of research in the education sector. Broadly speaking, ERPSystem is an IS. Therefore, the literature review on ERP post-implementation has also herein included other IS studies due to their conceptual relationships (Markus and Tanis, 1999).

Among several studies reviewed (eg., Dwivedi et al., 2015; Ifinedo et al., 2010; Law et al., 2010; Ganesh & Mehta, 2010; Kushwaha, 2015; Noaman & Ahmed, 2015; Khare, 2014; Rubik, 2014; Seo, 2013; Abugabah & Sanzogni, 2010; DeLone & McLean, 1992, 2003, 2004; Ala'a & Heeks, 2010; Xia et al., 2010; Al-Shamlan & Al-Mudimigh, 2011; Doll et al.,1994; Bailey & Pearson, 1983), most of them were on contexts in developed countries; studies from developing countries were limited and none has been found from any organisation in Botswana. This study is an attempt to fill that gap. The review focussed on identifying relevant constructs, theories and models that could singly or in combination be adapted to the current study. The following section provides the literature to the background and the motivation of this study; it explains why this study is relevant in the context of UB.

2.3   ERP System Implementation Challenges and the Relevance of this Study

In 2012 University of Botswana (UB) launched an ERP System to replace its legacy system called Integrated Tertiary System (ITS), and it became fully operational in the following year. The most important goal of ERP System in UB is to integrate different administrative and academic functions into more systematic and cost-effective structures and thus gain competitive advantage, including in the fields of human resource management, facilities management, financial systems and student administration, while these were supported separately in the legacy systems.

Several scholars (eg., Al-Shamlan & Al-Mudimigh, 2011; Xia et al., 2010; Noudoostbeni et al., 2009) reported that the ERP System implementation can be complex and very risky for various reasons, and often there can be numerous challenges during implementation; these can adversely affect its performance in the post-implementation phase; users can become frustrated and confused by the errors they make in their early stage of learning as it is common with huge

ISs such as ERP. The ERP System environment of UB is not an exception and hence the purpose of this study.

Despite promises of numerous benefits of ERP Systems, most of the literature on ERP in higher education have shown a rather high failure rate at its implementation stage (Abugabah & Sanzogni, 2010; Dwivedi et al., 2015). Most ERP Systems are designed exclusively for business processes and there are many barriers to seamless implementation of such systems in higher education institutions (Rubik, 2014), one of them being the need for software customization to cater for the unique needs and context of the education environment, and the resulting degree of complexity.

Scholars (eg., Ala'a & Heeks, 2010; Dey et al., 2013; Al-Shamlan & Al-Mudimigh, 2011; Xia et al., 2010; Noudoostbeni et al., 2009; Koch, 2011) argue that such problems are not uncommon, and in practice, it can cause performance issues in the go-live stage, and even beyond. Thus, there can be numerous serious challenges during implementation and these can adversely affect its performance in the post-implementation phase. They opine that if the implementation challenges are not identified early enough and addressed timeously and tactically, the implementation could end up in high rates of implementation failures and great financial losses. Seo (2013) reported that as a result of unresolved challenges, some organisations have not achieved fully their expected goals and some others have even utterly failed with the implementation of ERP Systems. According to Scholars listed above, most of the challenges arise as a result of:

(i)   ERPSystems' complex nature and possible challenges during implementation; these are often underestimated by the project implementation team.

(ii)   Generic off-the-shelf ERP software packages are normally designed to meet general requirements of large business organisations. Compared to corporate environments, the HE

sector has unique, and even more complex organizational dynamics and goals that are very different from other business environments. These generic software may not be fully compatible with the structure and business processes found in many HE institutions. Therefore, software customisation is inevitable when used in academic environments. Although customisation and addition of new modules to generic systems seems hassle free, literature indicates that interfacing as well as synchronising each module with other functional divisions sometimes can be complex and time-consuming due to numerous technical, managerial, and organizational challenges. Besides these issues, there are other possible challenges that may arise in the post- implementations phase, some of which are:

(i)   Resistance to adapt to changes with the new technology;

(ii)   Inadequate training and in-house support staff by vendors;

(iii)   Unsatisfactory user skills, beliefs and attitude;

(iv)   Unrealistic end-user expectations;

(i)   Inadequate support from the management;

(ii)   Inadequate training;

(iii)   Inadequate technical support;

(iv)   User attitude towards technology. As argued by Koch (2011), users play an important role and can influence the success or failure of a system.

2.4   ASAS in UB and the Need for its Performance Evaluation

Among the several components of the ERP System, ASAS is the focus of this study. ASAS is a large-scale information system (IS), and has been in use since 2012 by both staff and students of UB. Literature indicates that evaluation is an essential component of the implementation as often there can be numerous serious challenges during implementation and these can adversely affect its performance in the post-implementation phase. Often UB instructors and students face challenges with the use of ASAS particularly in the beginning and end of every semester. The

satisfaction of users and hence the overall performance must be measured periodically to evaluate the success of implementation (Batada & Rahman, 2012). If these challenges are not addressed timeously and tactically, the implementation could end up in high rates of implementation failures and great financial losses. Early evaluation involving users can be useful to determine whether the system requires any modifications.

The role of end users in the evaluation process cannot be overemphasised because they interact with it very often and therefore, will have a better understanding of the issues; as a result, their involvement in the evaluation is essential. Thus, the study deals with human beings in the organization. User perceptions may also depend on users' beliefs, behaviour, attitudes, prior experience with complex information systems such as legacy ITS systems, and contextual organisational cultures/ factors that may vary from one organisation to another, and even from one country to another. According to Parr and Shanks (2000) strong considerations need to be given for national cultural issues, since critical success factors may vary significantly from one country to another. A notable point in the UB context is that it is compulsory for all employees and students to make use of the ERP System for all services. This makes a difference when considering certain dimensions of evaluation.

2.4.1 Motivation and identification of literature gaps

Most of the studies assessing success based on the D&M model have been carried out in developed countries; none has been found in the Botswana context. Considering the high failure rate of information systems implementation around the world, it is pertinent to conduct a study at UB as the ASAS/ERP has been in use for over four years. The researcher has also taken note of challenges faced by both instructors and students particularly in the beginning and end of every semester. Their concerns included system unavailability, slow system response and the like. Despite the importance of ASAS/ ERP System evaluation, there is lack

of a widely accepted evaluation framework that can be used as a template across all organisations. This is because the complex, multidimensional, and interdependent nature of IS success and complex end-user perceptions depend on certain social, cultural and organisational factors that may be different from one organisation to another. As far as this researcher knows, no formal evaluation of the System has ever been done. Therefore, it is hoped that outcome of the study can immensely contribute towards maintaining or improving current practices in UB, and achieve the full potential of ASAS / ERP Systems in UB as well as other similar organisations.

2.5   Information Systems Success Evaluation and Research Models

Since the 1970s, several scholars have attempted to develop models and instruments for measuring IS success (eg., Mason & Mitroff, 1973; Hamilton & Davis, 1980; Ives et al. 1983; Bailey & Pearson, 1983; DeLone & McLean, 1992, 2002, 2003; Doll et al., 1994; Alter, 2003; Sedera et al., 2004; Chang et al., 2008; Petter et al., 2008). Early emphasis was on explaining why some IS are more readily accepted by users than others; Davis's (1986, 1989) Technology Acceptance Model (TAM) is a typical example for this. Acceptance and usage alone, however, cannot be equated to success, although these are a necessary pre-condition to success.

Mora et al. (2006) report that formal systemic analysis of most of these models has revealed that most of them are either incomplete or have systemic inconsistencies, and have limited use. Other studies indicated that the past evaluations focussed on varied perspectives such as the financial performance of the organization and the relationship between continuous investment in ERP, business process performance, and technical efficiency (Chen and Lin, 2008). The End-User Computing Support (EUCS) instrument of Doll et al. (1994) and the User Information Satisfaction (UIS) instrument of Ives et al. (1983) were widely used; however, they were more appropriate to the context of accounting IS (Seddon & Yip, 1992).

According to Petter et al. (2008), the general challenge was that early attempts to define information system success were ill-defined due to the complex, interdependent, and multi-dimensional nature of IS success, until DeLone & McLean (1992) undertook a review of the research published during the period 1981–1987, and created a taxonomy of IS success based on this review. Mardiana, Tjakraatmadja, and Aprianingsih (2015) argue that among several models for defining IS success, DeLone–McLean model is the most prominent, established and well-known information system model for assessing IS success. It is the most-cited and commonly-used models in the IS literature for measuring the performance of information systems and understanding its success (Agourram, 2009; Petter & McLean, 2009). It was the first study that tried to impose some order to develop a comprehensive IS model and instrument for a particular context (Gable et al., 2008). The validity of the model has been widely accepted in IS research (Wu & Wang, 2007; Wixom & Todd, 2005). It is still the dominant basis of IS success measurement (Ojo, 2017; Mardiana & Tjakraatmadja, 2016; Kutlu & Alkaya, 2015; Urbach et al., 2009). The researcher believes that the D&M model can be used to assess the success of ASAS in the UB context.

One model that is comparable with that of D&M model is Sedera et al.'s (2004) IS success measurement instrument for enterprise systems. Although this instrument captured the multidimensional and complex nature of IS success and was rigorously tested within the context of enterprise systems (which overcomes a major shortcoming in previous IS empirical work), it is inadequate for the measurement of the system use and dependent variable, IS success. For the purpose of this study, the researcher has adapted the most prominent widely used D &M information system success model by contextualizing it for the UB environment.

2.5.1 User Satisfaction as a Measure of IS Success

User satisfaction is the extent to which users believe that the IS meets their needs, and it is characterised by a subjective rating of the system. The expected user needs include mainly the System's capacity to improve their job productivity and decision quality. User satisfaction is positively associated with organizational impact or net benefit.

Scholars (eg., Markus et al., 2000; Sedera et al., 2003; Althonayan & Papazafeiropoulou, 2013) argue that the definition and measurement of ERP Systemsuccess are arguably difficult; it cannot be measured directly since ERPSystems generate substantial and intangible benefits. Various reasons have been attributed to challenges encountered in the development of a comprehensive framework for IS success evaluation; one of them being the complex and multi-dimensional nature of IS success and difficulty in perfectly defining it.

However, several studies (eg., Platisa & Balaban, 2009; Delone & McLean, 2002; Abdinnour-Helm et al., 2003) indicated that there existed a strong link between Information user's satisfaction and Information System functionality performances. Based on a comprehensive review of 180 IS success literature, DeLone and McLean (2002) report that user satisfaction is a key measure of computer system success, if not synonymous with it.

According to them, if end-users feel that the system meets their needs and expectations, and they are highly satisfied, the project could be considered successful and have achieved its desired goals. Empirical results have shown a strong association between user satisfaction and net system benefits (Iivari, 2005). As a result, user satisfaction is a widely accepted measurement of information systems success (Wu & Wang, 2007; Althonayan & Papazafeiropoulou, 2013). Further they argue that if the use of an Information Systems (IS) is mandatory and user behaviour cannot be analysed directly, measurement of success in terms of

user satisfaction is adequate. Petter et al. (2013) argue that user satisfaction can be gauged indirectly by analysing users' perceptions of the system's quality dimensions (information, system, and service qualities).

2.5.2   *The DeLone and McLean Information System Success Model*

D&M Model was first developed in 1992 and was revised later in 2003 and 2004 with minor modifications based on reviews and contributions of many researchers over a decade. The revised model provides a robust indicator of the success of information systems by identifying six distinct, yet inter-related dimensions of IS success: 'System Quality', 'Information Quality', 'Use', 'User Satisfaction', 'Individual Impact' and 'Organizational Impact' (Zaied, 2012). Due to their inter-dependence, an action taken to enhance any one IS quality can positively impact the other two quality attributes and subsequently improve organizational performance. They offered possibilities to explore and describe the system environment from several angles. Of these dimensions, user satisfaction has emerged strongly in IS research as the key measure of success for information systems and services. The revised model is widely used by IS researchers (eg; Zaied, 2012; Althonayan & Papazafeiropoulou, 2013; Zhu et al., 2010; Petter, DeLone & McLean, 2008) as a framework and model in the evaluation techniques of information system success. According to DeLone and McLean (2002, 2003):

- The dependent variable 'user satisfaction' has a high degree of face validity - it is hard to deny the success of a system which its users say that they like.

- The appeal of satisfaction as a success measure is because most of the other measures are so poor; they are either conceptually weak or empirically difficult to obtain.

Further, the literature indicates that the D&M model has been applied and validated in many IS studies (eg; Brown & Jayakody, 2008; Urbach & Muller, 2012; Baraka, et al., 2013). This study

is guided by the revised D&M model (2003, 2004) with slight modifications that deemed suitable for the UB context. The original model is shown in Figure 1 below.
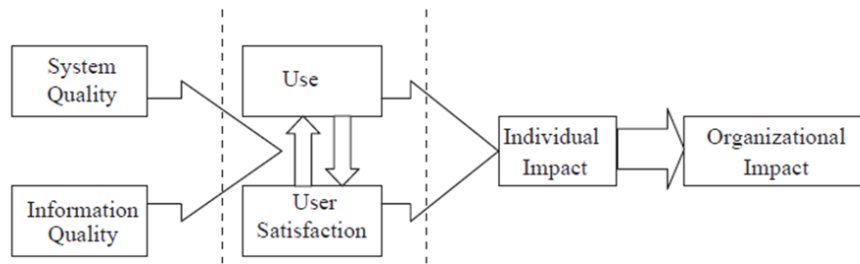
Figure 1: DeLone& McLean's Original Model (1992)

In the modified model, they combined individual and organizational impacts into a single impact variable called 'net benefits' and added 'service quality' as an important new dimension. Their reasoning for combining individual and organizational impacts was that the impact of the work of individual users collectively contributed towards overall organizational benefits. Further, they argued that 'Net Benefits' are the most important success measure as they capture a balance of positive and negative impacts. They also added 'Intention to Use' to the model because they hypothesized that an intention to use a particular system is determined by an individual perception toward the system and it has bearing on user satisfaction as well as their performance (DeLone & McLean, 2003). The revised model is shown in Figure 2 below.
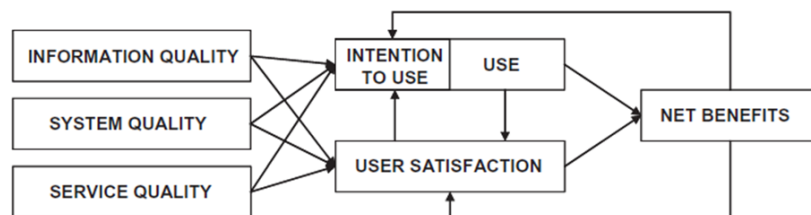
Figure 2: DeLone and McLean's revised Model (2003, 2004)

The constructs and their operationalization in this study are further explained thus:

(i)   *System quality:*   System quality is measured by attributes such as ease of use, functionality, reliability, data quality, flexibility, and integration (DeLone & McLean, 2003). It may also include perceived ease of use and response time for quick retrieval of information as and when needed to meet work demands are expected aspects of system quality. Ease of use and ease of learning are critical as ASAS/ ERP Systems as the users are moving to a new system as it is common in situations of technology change. Interface creates the first impression in the minds of users and it cannot be easily changed especially in those who have a negative attitude towards technology innovation. Interface has bearing on the system usability which refers to the ease of navigation, and being able to find necessary links without any sign of cluttering on the ERP System webpage.

System quality has a great role in contributing to the system success and hence organisational benefits. Gorla et al. (2010) argue that they have evidence for indirect effect of system quality (through information quality) on organizational impact. Thus system quality is an important aspect in IS success. From these views on system quality, the user expectations for successful performance of the system are: availability and stability, user friendliness, ease of navigation, ease of use, security and response time.

(ii)   *Information quality:*   According to Urbach and Muller (2012), information quality has been measured by examining the output of an information system in terms of timeliness, accuracy, reliability, and trustworthiness. This study considers ability to acquire information that is sufficient, that meets end-user needs, and is comprehensive in nature. It comprises a cluster of user expectations of the system outputs such as accuracy, adequacy, consistency, relevance, currency, reliability, timeliness, and perceived usefulness. 'Perceived usefulness' is defined as the extent to which an end-user believes that using the system enhances his or her

productivity and job performance (Mathwick et al., 2001; Susarla et al., 2003). Calisir & Calisir (2004) found that perceived usefulness of the system resulted in the highest level of user satisfaction. Information quality is often seen as a key measure of user satisfaction because inaccurate or incomplete information can adversely affect their quality of decision making, and hence job satisfaction. The need for high information quality is critical as it has a high organizational impact. The user expectations considered in this study for successful performance of the system are: ease-of-understanding, accuracy, currency, reliability, adequacy, and good presentation of the output.

(iii)   *Service quality*: In the context of IS applications, 'service quality' refers to the quality of support that ASAS users receive from the IS support personnel in terms of reliability, responsiveness, assurance and empathy. It is also described as the degree of discrepancy between customers' expectations for service and their perceptions of service performance. One good example is the Response/ turnaround time which is the elapsed time between a request for service or action and a response to that request. Service quality also includes the Management's support to the users in terms of empathy, motivation and policies as the use of ASAS/ ERP System by all is mandatory. From these views on service quality, the user expectations considered for successful performance of the system are: adequacy of training, promptness in responding to support calls from users, expertise of support personnel, addressing problems effectively, dependability and empathy. If users' perceived experience with the system matches with or exceeds their expectations, they take a positive attitude towards it in terms of satisfaction especially in a context where its use is mandatory and there are no alternatives.

(iv)   *User Satisfaction:* User satisfaction is the dependent variable in this study. This is considered one of the most important measures of systems success, often measured by overall user satisfaction (Urbach and Muller, 2012). It has a positive impact on user's job to improve

performance, increase productivity and effectiveness, improve decision making, and enhance job satisfaction (Ang & Soh, 1997; Morris et al., 2002). Measuring user satisfaction becomes especially useful, when the use of an IS is mandatory and the amount of use is not an appropriate indicator of systems success. User satisfaction can be measured indirectly by analysing users' perceptions of the system's quality dimensions (information quality, system quality, and service quality). These are encompassed in the system's adequacy, effectiveness, and efficiency as experienced by users. Further, the system must be easy to learn, produce accurate results and be easy to use without any frustrations. In a mandatory situation, users continue to use the system even without being satisfied.

(v) *Net Benefits:* It refers to the extent to which an IS is contributing to the success of different stakeholders in areas such as decreasing operating costs, improved decision making, decision effectiveness, job performance and effectiveness, business process change, competitive advantage, customer satisfaction, etc. All the four dimensions discussed above have a positive association with net benefits. This is also regarded as one of the most important measures of IS success.

The D&M Model uses an integrated construct called 'dimension' which is a combination of different quantifiable measures that include impact and quality. Outcome of the satisfaction evaluation can be used to identify strengths and weaknesses of the system. The strengths can be used for recognition and reinforcement of the service, while details of the weaknesses can help identify related problems and to suggest solutions for improvement. In other words, the model represents a complete measure of ISs.

(vi)   'Intention to Use'/ The 'Use' dimension

The 'Intention to Use'/ 'Use' dimension is an element of the D&M model. However, this study will not include it in the model of the study, as the use of ASAS is mandatory for all students and instructors of UB, and it will cause little measurable variation in user satisfaction. Users have to unfailingly make use of it whether they are satisfied or not satisfied with it. In other words, their beliefs about and attitude towards the system have little effect ontheir system use. The following section throws light on the conceptual framework of the study.

2.6   The Conceptual Research Framework

A conceptual framework consists of a network of interlinked concepts, assumptions, expectations, beliefs, and theories that supports and informs the research in operational terms, and provides theoretical rationale for the selection of concepts of the phenomenon under study (Jabareen, 2009; Robson, 2011). The revised D&M model also comprised six inter-related constructs of IS success: information quality, systems quality, user satisfaction, system use, Service Quality, and Net Benefits. Though 'system use' and net benefits were important measures of IS success, they were not used in developing the framework for this study for the following reasons.

(i)   Net benefit constitutes the extent to which an IS contributes to the success of various stakeholders including overall impact on the organization, whether positive or negative. However, the surveyed research subjects in this study were only primary users of the UB ASAS / ERP.

(ii)   Since the use of ASAS/ERP is mandatory in UB, according to Tilahun and Fritz (2015) measuring actual system use is pointless. When it is mandatory, expected end-users tend to make the best use of the system. According to Holsapple et al. (2005), satisfied ERP System users are more likely to be productive, especially where the use of such systems is mandatory.

(iii)   Kutlu and Alkaya (2015) argue that the 'Use' factor has been always a contradictory variable in the literature as its contribution to the model has been questionable for success evaluation. Even DeLone and McLean (2003) themselves stated that the relationship between intention to use and actual use is "notoriously difficult to measure".

Therefore, influence of the quality dimensions (information, system, and service qualities) in the D&M model was only considered in the study's research framework and model. The model guiding this study shown in Fig 2.5 below. It illustrates the conceptual relationship between three IS quality dimensions and user satisfaction; the relationship is that the three dimensions depicted in the model influenced user satisfaction which in turn affected the individuals' perception of the system's impact. These quality dimensions are clusters of various attributes/ user expectations that contribute towards user satisfaction as discussed under section 2.5.2; they are all vital for the success of the system. The IS quality dimensions are independent variables while user satisfaction is the dependent variable in the study.
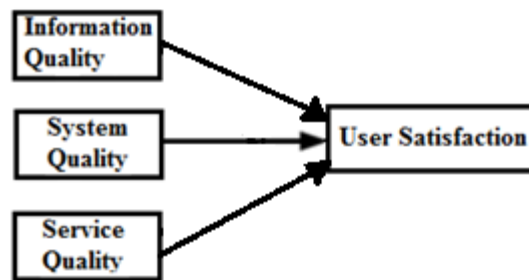
Figure 3: Research Model

The variables and relationships depicted in the model are important in assessing the success of UB ASAS. They provided basis for the two research instruments used in the study.

The research objectives are:

(i) To investigate end-user perceptions of the performance of UB ASAS in its post-implementation phase; and

(ii) To identify any factors that might have had direct or indirect influence on the perceptions of end-users of UB ASAS in its post-implementation phase.

The first objective was achieved using outcomes from both quantitative and qualitative methods while the researcher used semi-structured interviews to answer the second question. A case study survey design was employed to achieve the desired objectives.

2.6.1 Challenges of ERP System implementation: Organisational factors

The variables identified from the D&M Model for this study are technologically related. However, there are other contextual factors that may affect user perceptions of the system in its post-implementation phase. The researcher has made an attempt to understand these factors using interviews and its outcome was used to answer the second research question. By their nature, the influence of certain organisational factors cannot be controlled, but they were taken into account when interpreting results and answering the second research question. However, it has to be noted that any negative effect of organisational factors on the post-implementation success is likely to gradually diminish and become negligible as time passes as the use of ERP/ ASAS by all the intended users was mandatory in the UB context.

According to Helo et al., (2008), "Unlike other information systems, the major problems of ERP implementation are not technologically related issues such as technological complexity, compatibility, standardization, etc. but mostly [about] organization and human related issues...". These include factors such as users' beliefs, attitude, expectations, resistance to change, users' prior experience with legacy systems, and contextual organisational factors

such as top management commitment, incompatible business processes, poor change management strategies, inadequate user training, and cultural influences that may vary from one organisation to another. According to Pishdad & Haider (2013), the development and use of technologies such as ERP Systems are subject to social, cultural, organizational, technical, and other institutional pressures. They often become challenges in the smooth operation and functioning of the system especially in the post-implementation phase.

User characteristics play an important role in achieving success in an ERP environment (Zviran et al., 2005; Holsapple et al., 2005). This is particularly true when the technology is intended to replace a legacy system that may arise from resistance to adapting to a new technology, age, gender, education, and experience, and the associated varying user needs and expectations. Elderly people are more likely to fear new technology. Other factors may include lack of management support, and cultural influences. Light (2005) espouses the ERP product type, i.e. off-the-shelf or customised as a contextual factor and may be considered as a moderating variable.

According to scholars (eg., Bradley et al., 2006; Leidner & Kayworth, 2006) organizational culture has strong influence on IS management and success. Cultural influence on IS environments is often ignored, and it becomes the most frequent reason given for the failure. Talet and Alwahaishi (2011) argue that an IS implemented successfully in one culture may be a failure in another. According to Parr and Shanks (2000), strong considerations need to be given for national cultural issues, since critical success factors may vary significantly from one country to another. A notable point in the UB context is that it is compulsory for all employees and students to make use of the ERP System for all services. ASAS is only one of the modules of the ERP System. As a result, even those who were not satisfied with the ASAS were bound to use it.

2.7   Summary

Scholars argue that measurement of user satisfaction is a reliable means of reviewing IS post-implementation success. The literature review has identified a series of user satisfaction measurement variables that have bearing on users' belief, attitude and behaviour. These variables were categorised into five inter-related constructs: information quality, system quality, service quality, user satisfaction and net benefits by DeLone and McLean. The identified measurement variables and related user expectations were incorporated into a questionnaire that was later used to guide interviews. A framework was then developed in line with DeLone and McLean's IS Success Model to represent the relationship between IS implementation success variables and user satisfaction. A synthesis of research literature indicated that organisations that manage these constructs well and effectively could successfully reap the benefits of the system and achieve return on its investment (RoI). In the next chapter, the methodology used in the study has been discussed.

CHAPTER 3: METHODOLOGY

3.1 An Overview

The previous chapter presented a review of the relevant literature which focussed on the motivation to the study and key elements that are fundamental to informing this study and providing a conceptual framework. This chapter presents the methodology used for conducting the study. The chapter begins with a general description of the concepts of research methodology, general views on and characteristics of three philosophical paradigms (*Positivism, Interpretivism and pragmatism*), two popular research methods (*qualitative and quantitative*) and their roles in social research.

The chapter then presents the research methodology employed to conduct this study. Schwandt (2007) describes research methodology as "a theory of how inquiry should proceed. It involves analysis of assumptions, principles, and procedures in a particular approach to inquiry (that in turn governs the use of particular methods)". In the process, the researcher identified case study strategy as appropriate to the study, and then discussed the rationale for their choice. Also discussed are other research processes that include the development of research design, selection of the methods of data collection as well as analysis, research population and study sample, and procedures for ensuring the trustworthiness of findings and maintaining ethical standards within a qualitative case study framework. The chapter ends with a summary. The next section discusses what 'research methodology' is all about and attempts to distinguish between research methodology and research methods.

3.2 Introduction to Research Methodology

The purpose of research, in general, is the development of new knowledge in a particular field. Different definitions of research methodology can be found in the literature. According to

Brown (2006) research methodology is the philosophical framework within which the research is conducted or the foundation upon which the research is based. It is the strategy, plan of action, process or design lying behind the choice and use of particular research methods (Crotty, 1998, p.3). According to Kothari (2004), research methodology is the science of how research projects can be undertaken and describes the stages that researchers go through whilst they decide upon the best means of addressing their research problem, and the logic behind their reasoning. Dawson (2002) argues that research methodology is also concerned about the ethics, potential risks and problems, and the limitations of any research approach. Dawson also emphasises the need to establish procedures for enhancing the trustworthiness of findings and for controlling bias.

In short, in a research methodology, the researcher throws light on the philosophical assumptions, research design, population of the study, sampling procedure, methods of data collection and analysis, research ethics, trustworthiness, validity and reliability issues, delimitation and limitations. Choosing the most appropriate methodology is one of the important aspects of research to achieve the desired outcomes.

The key terms of methodology comprises the strategy that translates ontological and epistemological principles into guidelines and steps required to systematically solve a research problem in the most reliable, valid and accurate way. The term *Ontology* refers to a branch of philosophy and it refers to ways of constructing reality, "how things really are" and "how things really work" (Denzin & Lincoln, 1998, p. 201); that is, whether reality is objective that really exists independently, or only a subjective as created in our minds.

Epistemology refers to the true nature of human knowledge and understanding that can possibly be acquired through different types of inquiry. Bryman (2012) argues, "an epistemological issue concerns the question of what is (or should be) regarded as acceptable knowledge in a discipline" (p. 6).

Methodology refers to the best procedures or plan of action to be used to generate the desired knowledge and understanding in a reliable manner. In simple words "Ontology is reality, epistemology is the relationship between that reality and the researcher, and methodology is the technique used by the researcher to discover that reality" (Healy & Perry, 2000, p. 119). They are inter-related and may be diagrammatically depicted as below.

Research methodology has to be distinguished from research methods. Methods refer to all those instruments/ techniques/ procedures used for data collection and analysis, and evaluation of accuracy of the results obtained in any type of research. Methodology informs the methods or techniques to be used for data collection. Research methodology has a wider scope than that of research methods in that methodology is also concerned about the logic behind using a particular method such as why that method was considered, and why other methods were not so that research results are capable of being evaluated either by the researcher or other researchers. Research methodology also focuses on clarifying a host of similar other questions such as why a particular research was undertaken, how the research problem was defined, in what way and why the hypothesis or the research objective was formulated, what data have to be collected and why a particular method was adopted, why a particular technique of analysing data was used, etc. Research methods are often determined by the research methodology adopted in a study. Therefore, it is not only important for the researcher to know the research methods, but also the methodology that is capable of providing valid answers to the research question(s).

This study is an evaluation research as it focussed on evaluating how satisfied were the end users of ASAS with its performance in its post-implementation phase. In this study ontology refers to the experiences of the end users with the performance of ASAS in its post-

implementation phase. The aim of this study was to use appropriate methodology to discover perceptions about the performance (epistemology) of the system under study.

3.3 Philosophical Paradigms

The term research philosophy refers to the development of knowledge and the nature of that knowledge. It is often explored through the concept of research paradigms as commonly done in social sciences. The term paradigm was first used by Thomas Kuhn (1962) to denote a conceptual framework and it refers to a research culture with a set of beliefs, values, and assumptions that a community of researchers has in common regarding the nature and conduct of research. According to TerreBlanche and Durrheim (1999), a research paradigm is an all-encompassing system of interrelated practice and thinking that define the nature of enquiry along three dimensions: ontology, epistemology and methodology.

Researchers adopt certain important philosophical assumptions about the way in which they view the world or on the nature of reality (whether it is objective or subjective), and about the relationship between knowledge and the empirical world in preparation to undertaking a research study. These assumptions can help them decide the most suitable research methodology and methods. It is therefore important to know what the researcher's assumptions are in a study. Leedy and Ormrod (2010) argued, "Assumptions are so basic that, without them, the research problem itself could not exist" (p. 62).

There are two dominant ontological and epistemological traditions/ideologies: *Positivism* and *Interpretivism*; they take contrasting positions about social reality (ontology) and the ways humans create their knowledge about the social world (epistemology). Inquiry whether from the positivist or interpretive paradigm is based upon standards that relate to answer the questions

about ontology, epistemology and methodology (Guba and Lincoln, 1994). These are further discussed below.

(i)   Positivism

Positivism is described generally as an approach to social research that seeks to apply the natural science model of research to investigating social phenomena. Positivists believe that there is an 'objective reality' 'out there' waiting to be discovered and that this reality exists independently of whether or not man has knowledge of it, and whether or not the social researcher has yet discovered its existence (Nudzor, 2009). Thus, the positivist epistemology is one of objectivism, and positivist methodology is directed at explaining relationships. The realist/objectivist ontology and empiricist epistemology (concerned with the hypothetical deductive testability of theories) underlying the positivist paradigm requires a research methodology that is objective, where the emphasis is on measuring variables and testing hypotheses. Positivist research uses experimental designs to measure variables and testing hypotheses. Natural scientists take a positivist stance; they generally adopt objective measurement methods such as quantitative method of surveys to collect data, and to formulate laws and generalization using deductive approaches.

(ii)   Interpretivism

According to Gephart (1999), there is no objective knowledge which is independent of thinking, reasoning humans; knowledge of reality is shaped through social contexts. In other words, knowledge and meanings are from interpretation of people's subjective experience of the external world and take the form of verbal descriptions and explanations. It differs from person to person. The ontological position of interpretivism is based on the view that reality is subjective and is constructed through human and social interaction. The epistemological stance of interpretivism is one of subjectivism which is based on real world phenomena. Different

people may understand the same phenomena and construct meaning in different ways. Interpretivist researchers attempt to understand phenomena through accessing the meanings that participants assign to them (Deetz, 1996), and make conclusions based on their own interpretations. They use qualitative meaning-oriented methodologies, such as case studies, phenomenology, hermeneutics and ethnography through interviews, participant observation, etc in order to understand the subjective experiences of human beings in social contexts. This is in contrast to positivist belief that reality exists objectively and independently from human experience.

Table 1: Research paradigms and their research designs

Research Paradigm	Scientific Method	Ontology	Research Strategy/ Design
Positivism	Deductive approach, Testing of theory	Objective	Quantitative
Interpretivism	Inductive approach, Generation of theory	Subjective	Qualitative
Pragmatism	Deductive/ Inductive	Objective or subjective	Qualitative and /or quantitative

The researcher has selected Pragmatism as his philosophical stance for the study for reasons discussed below.

3.3.1 Pragmatism: Philosophical Paradigm of the Study

A researcher's paradigm choice is by and large a reflection of his/her ontological (world view), and epistemological (valid and appropriate way of developing knowledge) stances. That is, these implicit beliefs, along with the researcher's disciplinary focus and past experiences, will influence his or her philosophical approach to research, even before the topic is chosen (Grix, 2004). This will again be influenced by the nature of the phenomenon under study, the

researcher's own research interests, and the particular view of the relationship between knowledge, the process by which it is developed, and various institutional contexts. Therefore, knowing the researcher's philosophical stance right from the beginning in the context of the particular research at hand is quite essential.

The main purpose of this study was to evaluate how the UB users of ASAS perceived the system performance in its post-implementation phase, whether they were satisfied or not. ASAS/ ERP is an IS which is a multidisciplinary field; human perceptions of 'satisfaction' with the IS in a social system is a complex, multifaceted construct. Under these circumstances, the researcher believed that enquiry based on a single paradigm and the associated research approach may not yield comprehensive results. Therefore, he thought it was more sensible to base the study on the philosophy of pragmatism which has bearing on both positivism and interpretivism. However, the study had more orientation towards interpretivism.

Pragmatism allows the use of multiple methods, different world views and assumptions, and procedures to collecting and analysing data that best meet the needs and purposes of the research. Thus, the study was positioned somewhere on the positivist-interpretivist continuum. Since the study focuses on understanding complex human perceptions and experiences, and may require additional probing in case the qualitative findings vary widely from the quantitative findings, the positioning of the philosophical stance was more towards the interpretivist side. Unlike Positivism and Interpretivism, pragmatism philosophy can integrate more than one research approach and research strategy within the same study.

3.4   Types of Research Approach: Quantitative and Qualitative

There are numerous ways of classifying research, based on several criteria such as its theoretical versus practical emphasis, the type of inferential process used, mode of enquiry or methods of data collection and analysis, etc. Common classifications are into quantitative and qualitative.

These research approaches are underpinned by their own different philosophical assumptions about knowledge claims (about what constitutes knowledge), strategies of inquiry (general procedures of research), and specific research methods (detailed procedures of data collection, analysis, and writing). These different elements are then translated into processes in the design of research. The two approaches have advantages and disadvantages; the choice depends on the research problem, the researcher's personal experiences, and the audience for whom the results are directed to.

(i)   Quantitative Research

In simple terms, quantitative enquiry is one that collects and analyses quantitative data while qualitative study is an approach that collects and analyses qualitative data. Creswell (2014) defines quantitative research as a means for testing objective theories by examining the relationship among variables, which, in turn, can be measured, typically on instruments, so that numerical data can be analysed using statistical procedures. Quantitative methods emphasize objective measurements, seek the generation of data in quantitative form, and make use of mathematical, numerical or statistical analysis to evaluate, predict or compare the relationship between variables, and to test their strengths and significances. Quantitative research is also often concerned with testing hypotheses derived from theory, and is deductive in nature. Quantitative research is underpinned by positivist claims where the emphasis is on experimental designs (often observing and recording), measuring variables and testing hypotheses; data sources can be polls, questionnaires, surveys, laboratory experiments, mathematical modelling, etc. Quantitative methods were originally developed in the natural sciences to study natural phenomena, however now it is popular in the social sciences also.

(ii)   *Qualitative Research*

In contrast, qualitative research involves understanding the experiences, perspectives, diverse

opinion, attitudes, and thoughts of participants within in their natural settings- the social and cultural contexts, through various strategies of inquiry, and drawing conclusions/ explanations for certain behaviours and patterns based on inductive approaches from details provided by participants. It uses constructive perspectives to generate knowledge. Qualitative methodology is underpinned by subjectivist ontology and interpretivist epistemology. This assumes that meaning is embedded in the participants' experiences and that this meaning is mediated through the researcher's own perceptions (Merriman, 2009).

According to (Denzin & Lincoln, 2005) qualitative researchers study things in their natural settings, attempting to make sense of, or interpret phenomena in terms of the meanings people attach to them. Qualitative research places emphasis upon exploring and understanding "… the meaning individuals or groups ascribe to a social or human problem" (Creswell, 2014). Research in such a situation is a function of researcher's insights and impressions. Qualitative data sources include explorative surveys, interviews, participant observation, focus group, and document reviews. Qualitative research produces a result which is an interpretation by the researcher of others' views filtered through his or her own (Merriam, 2009). Central to qualitative inquiry is the presence of multiple "truths" that are socially constructed, while quantitative methods are characterized by a single "truth" that exists independent of human perception (Denzin & Lincoln, 2005).

Creswell (2014) distinguishes five types of qualitative research in social science: biography, phenomenology, grounded theory, ethnography and case study. These can be used singly or in combination. For the purpose of this study, the researcher will elaborate only on the case study in Section 3.6.3, since it is most appropriate design applicable in this study.

A limitation of qualitative research is that researchers are open to misinterpretations because of their experiences, biases, perceptions, interests, motivations, and subjectivity and biases, and it may negatively affect the research design, data collection and interpretation of findings. Therefore, it is critical for the researcher to declare or to make any of these explicit throughout the study.

Comparison of Quantitative and Qualitative Methods

There is distinct difference between qualitative and quantitative research in their ontological and epistemological underpinnings as well as their methods of data collection, analysis and presentation. Ontologically, quantitative approaches are objectivist (meaning that social phenomena are believed to exist independently of individuals) qualitative approaches are constructionist (meaning that reality/ social phenomena and their meanings are socially constructed). Epistemologically, quantitative research is associated with a positivist approach (holding the belief that objective knowledge can only be derived from direct observation or experience as through scientific approaches) while qualitative research comes from an interpretivist perspective (that is, interpreting and understanding phenomena through meaning that people attach to them). Quantitative research tests theory through deductive approaches as opposed to qualitative research generate a theory using inductive approaches.

While quantitative research often use statistical methods to analyse data and to present results (represented by numerical or statistical data), qualitative research attempt to understand phenomena in their natural settings, perform much of the analysis during the data collection itself with concurrent validity checking (probing, replicating, triangulating, etc), with little need for more analysis afterwards, and present data as detailed descriptions of the phenomena under study.

Stake (1995) describes three major differences in qualitative and quantitative emphasis, noting a distinction between: explanation and understanding as the purpose of the inquiry; the personal and impersonal role of the researcher; and knowledge discovered and knowledge constructed.

3.4.1 Research Approach of the Study

'User satisfaction' of information systems is a complex multifaceted theoretical construct, and its measurement or evaluation is often complex and problematic. The researcher believes that no single research approach is perfect particularly for a multidisciplinary field such as that of information systems which is often considered complex. Skok and Legge (2002) argue that in complex ERP projects which involve multiple stakeholders and interrelationship between them, a single data collection technique would be unlikely to provide a clear picture of the impact of the ERP System on stakeholders' performance.

The focus of this study is on getting deep understanding of users' perception of their experiences and the meanings that they attach to these experiences within the social and cultural context of UB; in the process, the researcher attempted to make sense of, as well as interpret, their diverse subjective experiences, and arrive at logical conclusions on whether they were satisfied with the ASAS/ERP System in its post-implementation phase, and if they were not, what factors caused dissatisfaction. This helped to determine what could be done in future to improve situation. Therefore, the researcher decided to use both quantitative and qualitative methods of data collection.

The perspectives and experiences of end users with the system cannot be justifiably summed up in a single number because it cannot inform the human motivation behind certain preferences and behaviours. As participants' experiences and the meanings that they attach to these

experiences are diverse, the researcher expect multiple interpretations of reality from them. As a result, qualitative approach played a very important role in this study. Therefore, the use of the two approaches in combination helps to overcome weaknesses and to make use of the strengths of each method, so that the overall strength of the study is greater than either approach alone. The use of quantitative and qualitative approaches in the same study provides a fuller picture and deeper understanding of the phenomenon being investigated.

The quantitative phase of the study comprised the administration of a structured questionnaire (in the form of web-based online survey) to the entire students and instructors of UB. Descriptive statistical method was used to analyse the quantitative data. Information from the questionnaire survey was used for two purposes: (i) to explore participants' views on the ASAS performance, and (ii) to formulate appropriate questions for interviews.

A major benefit of using both approaches in the same study is its flexibility in the choice of research methods/ techniques. For example, under the quantitative results, there may be an instance in which some participants may be satisfied with the system but may have given a low rating, or another instance of results not matching with the qualitative findings. In the qualitative phase, the researcher could probe for more in-depth insights and to understand what factors caused the low satisfaction rating or a mismatch in the findings.

The qualitative results were compared with quantitative research findings, and used to interpret the numerical findings. The qualitative phase also helped to identify the IS quality factors and any organisational factors that have contributed towards user satisfaction which in turn was an indirect measure of the system performance and success. Findings from the two approaches allowed triangulation as well as justification of quantitative results in numbers which, in turn, increased the credibility of the study.

3.5   Research Design of the Study

A good design represents a logically sequenced outline of what the researcher will carry out from the time the research objectives have been established and finally conclusions have been drawn. It will include the research methods to be used for gathering and analysing the data, and reporting the outcome to satisfactorily answer the research questions. Therefore, identifying the appropriate research design is important in establishing the general framework and success of the study. Generally a good research design maximizes the reliability of the data collected and validity of findings, and conclusions. The choice of a design depends on the nature of the research problems and the researcher's philosophical stance.

The research design for this study has been mainly an interpretive case study. The researcher used both quantitative and qualitative methods of data collection; the rationale for this has been discussed in Section 3.4.1. Findings from both methods were then compared and triangulated. Given below is a diagrammatic representation of the research design for this study.
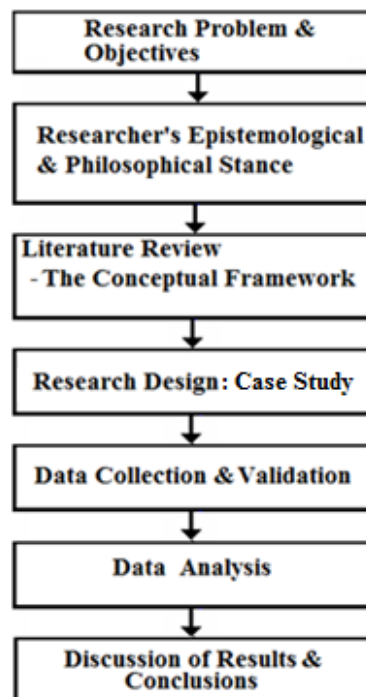
Figure 1: Research design of the study

3.5.1 Case Study and its Rationale

In general, a case study explores in depth one or more individuals, an event, an activity, a program, or an organisation. Yin (2009) defines case study as an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and the context are not clearly evident. Gillham (2000a) defined case study as an investigation to answer specific research questions which seek a range of different evidences from the case settings. This is because a case study can also uncover other information that was not previously known to or anticipated by the researchers. According to Walsham, (1993), case studies provide the main vehicle for research in the interpretive tradition. Myers (2010) recommends case study as a well suited approach to IS research, since the aim is to study information systems in organizations. Yin (2009) argues that case study design is particularly suited to situations where it is very difficult to separate a phenomenon's variables from its context.

Philosophically, case study research can be orientated from a realist or positivist perspective where the researcher holds the view that there is one single reality, which is independent of the individual and can be apprehended, studied and measured, through to a relativist or interpretivist perspective (Harrison et al., 2017). This philosophical versatility provides the researcher with the opportunity to decide the methodological orientation used in the conduct of the case study (Yin, 2014). As a result, a case study can be either quantitative or qualitative or can use both quantitative and qualitative methods in the same study (Merriam, 2009). This research was conducted using qualitative approaches backed by quantitative methods for data collection.

Given the interpretive stance adopted in this research, the nature of the phenomena under study and the nature of the research questions, the researcher believed that the case study

approach was very appropriate strategy for this study because it could help to interpret and understand the insights and experiences of subjects who were also influenced by institutional variables in a real-world situation. Case study designs can address a wide range of questions that ask why, what, and how of an issue and assist researchers to explore, explain, describe, evaluate, and theorize about complex issues in context (Harrison et al., 2017). The research questions in this study begin with 'how' and 'what'. According to Stake (1995) case study is the most suitable application of qualitative research in educational research when the aim is to understand meanings by studying phenomena in its natural context. According to Merriam (2009), in applied fields such as education, where the findings can improve upon existing practices, case study is the most appropriate research approach. Thus it helps to understand the problem in great depth and find ways for improving their experiences in future. This has advantage over other similar methods such as surveys as it can reveal in greater detail the unique insights and experiences of individuals and their concerns on the performance of ASAS.

Face-to-face interviews are commonly used in case studies because they constitute one of the most powerful ways in which the researcher can establish rapport with participants; it helps the researcher to gather rich data to understand participant perceptions, and subsequently provide 'thick descriptions' of the phenomena under study (Yin, 2014). Overall, the combined use of qualitative and quantitative methods enabled the researcher gather enough insights to effectively answer the research questions more accurately than if only a single method were used. Thus, the study enabled the researcher to interpret and understand the user perceptions on the performance of UB ASAS in its post-implementation phase, and propose ways of maintaining or improving current practices.

3.5.2 Interviews as research instrument

Interviews constitute one of the most important and essential sources of case study information (Yin, 2009). Interviews can be either structured, unstructured or semi-structured. Structured interview often consists of prepared closed-ended questions and it lacks flexibility required to probe participants concerning issues related to the problem. Unstructured interviews are informal and little focussed; the interviewer and interviewee talk freely about whatever comes up where the latter is responsible for determining the direction of the interview.

Semi-structured interview is generally a combination of the above two types, where the interviewer has the freedom to follow up points as necessary within a given structure. Semi-structured interview has a set of pre-determined open-ended questions (Ritchie & Lewis, 2010). The most useful interview format for conducting qualitative research is often semi-structured because it gave the researcher flexibility to ask relevant follow-up questions based on what the interviewee says, and thus probe for more in-depth information. It is very effective in exploratory research such as this study in which one of the purposes is to identify the possible factors that might have contributed towards the success or failures of the system. Given these potentials, the researcher opted a semi-structured interview approach within the qualitative case study framework for the study.

3.6 Description of the Research Population and Sampling

The research population comprised all students (about 20000) and academic staff (1000) of UB. All of them were given opportunity to participate in the web-based questionnaire survey. However, only 17 instructors and 43 students completed the questionnaire despite a two reminders in a gap of two weeks. Thus there were only a total of 60 participants in the sample for descriptive statistics. According to Fraenkel and Wallen (2006), a sample is very likely to represent the target population if it is large enough. A sample size of 60 is obviously low on

such a large population. Therefore, less importance will be given to the quantitative component of the study than the qualitative side except to back the latter component.

For the qualitative part of the study, the initial plan was to identify a purposive sample from those who responded to the questionnaire survey based on certain criteria that included readiness to participate in the interview expressed through the questionnaire survey, and an indication from the questionnaire responses if they formed a representative of the whole population (eg; if they left several questions unanswered, there was a problem to proceed to the next level). A sample correctly selected from a population allows true inferences to be made about the population. Other desirable factors, not essential though, were a balance in gender, and a spread across all levels of study (from 2 to 7) for students and across all faculties for staff. The researcher hoped to get about at least 60 students (with 10 students from each faculty) from different levels/ programmes (excluding 1st year students as they may not have adequate experience with the ASAS), and about 30 academic staff (with 5 staff from each faculty) from different faculties using techniques discussed above. More subjects could not be accommodated for individual interviews because of time constraints in a study of this scope. Also, these participants were expected to come from all different sections to avoid prejudice of their perceptions.

However, no one from the respondents of the online questionnaire survey agreed to participate in follow up interviews. Thus, the use of web-based questionnaire approach for selecting the purposive sample did not materialise. As an alternative, a convenience sampling was carefully done whereby only the 'right subjects' who could provide meaningful responses/ data appropriate for the study were selected based on researcher's knowledge and professional judgment of their background, and their willingness to participate in the study. By this a convenience sample was formed using the criterion of 'data saturation'. Data

saturation method (Mason, 2010; Bowen, 2008) is a useful approach for sampling in qualitative research though the point of saturation cannot be predicted in advance. In this method, researcher has to continue the interviews with a group of prospective subjects until no new insights seem to be emerging in the interviews; in other words, until additional subjects don't provide any more new information. In the study, by interviewing the first six instructors and eight students, the researcher noticed that the information gathered from them was more or less similar. Fusch and Ness (2015) argue that failure to reach data saturation has an impact on the quality of the research conducted and hampers content validity. Therefore, two more participants in each group were interviewed to confirm that no fresh information was forthcoming. Thus the sample for the interviews in this study comprised eight instructors and 10 students. Therefore, the qualitative component of the study used a sample of 18 participants who could give valuable information. The researcher believes that this sample of 18 subjects for the qualitative component of the study form a reliable sample as the sampling procedure has conformed to the criterion of data saturation.

3.7   Research Data Collection

The choice of particular methods of data collection and analysis depend upon the research objective and the type of information being collected. Whatever method is used, the importance of collecting reliable and valid data in any research cannot be overemphasised because data is the input of a study; the relevance and accuracy of conclusions are entirely dependent upon it.

The aim of this research was to understand how the end-users of ASAS regard the success level of ASAS in its post implementation phase. The study used a structured questionnaire and semi-structured interviews. The following sections discuss details on the construction and validation of these instruments.

3.7.1 Questionnaire Development

The constructs adapted from the D&M Model for information systems success were the basis of both research instruments. The questionnaire comprised 19 items which were tied to the three independent variables (system, information and service quality) and a dependent variable (user satisfaction) derived from the D&M Model. Items assessing each construct were adapted from prior studies with validated scales (Ojo, 2015; Cho et al., 2015; Tilahun & Modeling, 2015). The 19 closed-ended items were based on a five-point Likert-type scale from "Strongly Disagree" = 1 to "Strongly Agree" = 5. The questionnaire was given to subject experts for the purpose of adjudging face and content validity. Adjustments were made where necessary before it was posted online. The questionnaire was administered as a web-based online survey. More details are provided in Section 3.10.

In order to maximise the response rate, reference was made to research permit obtained from Offices of the Research and Development as well as the Deputy Vice Chancellor (Academic and Student Affairs) for the authenticity of the research study. Ethical consideration was adhered to as discussed in Section 3.13. Web-based survey delivery was chosen because it is often quicker and very cost effective. It works well in the UB contexts as all participants have email and web access. The questionnaire can be found in Appendix A. The following section elaborates on the interview protocol followed in this study.

3.7.2 Interview Protocol

The interview protocol comprised a total of eight open-ended core questions (see Appendix D) based on questionnaire outcome. Based upon the respondent's answers, the researcher supplemented the core questions with additional probes to draw out the details necessary to clarify any ambiguous responses, to identify any emerging themes and to obtain rich data.

3.8   Validation of Instruments in the Study

Both quantitative and qualitative instruments were validated for establishing the rigor and trustworthiness of the research findings. These include positivistic criteria of validity and reliability from quantitative perspective, and the corresponding concepts credibility, transferability, dependability, and confirmability from qualitative interpretive perspective. Validation of data was essential because if the data were not trustable, then the analysis and hence the findings were not reliable.

3.8.1   Reliability and Validity in Quantitative Research

Reliability is concerned with internal consistency; it is the extent to which a particular data collection method or tool (eg., a questionnaire) will produce similar results under different circumstances such as when used by different individuals or at different times by the same individual. It can be established by various methods. Cronbach's Alpha (α) test is commonly used when the instrument used is of multiple Likert type questionnaire that forms a scale. It refers to the level of homogeneity among the measured items in a set; that is, how closely related a set of items are as a group. There are six items of different attributes under each quality variable. This is quite useful to ensure that grouped attributes measure the underlying variable. Alpha value ranges from 0 to 1. There are many different but related suggestions in the literature (Field, 2013; Rovai et al., 2013) on the acceptable levels of Alpha. Accordingly, a Cronbach's alpha range of $0.70 < \alpha < 0.90$ indicates high reliability, and $0.50 < \alpha < 0.70$ moderate reliability. A commonly-accepted rule of thumb is that an alpha value ≥ 0.5 is sufficient for research that is exploratory in nature.

Alpha test was carried out for the entire questionnaire of 19 closed-ended items and also for each IS quality construct in the questionnaire: System Quality (6 items), Information Quality

(6 items), Service quality (6 items), and User satisfaction (1 item). SPSS software, Version 24 was used for this purpose. The results are presented in Table 2 below.

Table 2: Reliability test results- Cronbach's Alpha

Variable	*Cronbach's Alpha*	*N*	*Reliability*
System Quality	0.629	6	moderate
Information Quality	0.640	6	moderate
Service quality	0.650	6	moderate
Entire questionnaire	0.801	19	high

The system quality, information quality, and service quality dimensions had Cronbach's α scores of 0.629, 0.640, and 0.650 respectively, indicating moderate levels of internal consistency. The entire questionnaire, which consisted of 19 questions, had an α score of 0.801, which represents high internal consistency. The results reveal that all the variables used in the survey: System Quality, Information Quality, and Service quality had a coefficient larger than 0.5; therefore, they are all internally consistent.

Validity refers to the extent to which what we believe we are measuring accurately represents what we intended to measure. Internal validity indicates the accuracy of causal inferences drawn from a study's findings. External validity indicates the extent to which a study's findings can be applied to other similar situations. In order to ensure the content validity of the questionnaire, it was first checked by two experts in the field and then pilot tested with a small sample of respondents in order to check people's understanding and ability to answer the questions, and highlight areas of confusion. The need for a few changes was noted and was effected before posting the revised questionnaire to the participants.

3.8.2   *Trustworthiness in Case Study Research*

Qualitative researchers often employed the concept of 'trustworthiness' of data, as this better captured the subjectivist approach in qualitative studies. The criteria for testing the trustworthiness of qualitative studies are: confirmability, credibility, transferability, and dependability. These are explained as below:

Elements of trustworthiness	The element is defined as:	How to achieve this:
Credibility (equivalent to the traditional quantitative view of internal validity)	Confidence in the 'truth' of the findings	Researchers must seek to ensure that their study demonstrate a true picture of the phenomenon under investigation, from the perspective of participants in the research. Triangulation of data from multiple sources, utilizing peer debriefing, review of the draft case study report by the participants, etc can enhance credibility.
Confirmability	The degree of neutrality or the extent to which the findings of a study are shaped by the respondents and not researcher bias, motivation, or interest.	Researchers must use multiple sources of data and take steps to ensure that findings emerge from the data (experiences and views of the informants) and not their own predispositions and subjectivities. The researcher must acknowledge his own predispositions in the report, and the reasons for favouring one approach when others could have been taken explained.
Transferability	The extent to which the findings of one study can be	Researchers must provide sufficient details of the research context and

(equivalent to the traditional quantitative view of external validity)	generalized or transferred to other contexts or settings.	main assumptions for a reader to be able to decide whether the prevailing environment is similar to another situation and whether the findings can justifiably be applied to the other setting. Transferability can also be addressed with purposive sampling, and by providing thick descriptions in the dissertation.
Dependability *(equivalent to the traditional quantitative view of reliability)*	The extent to which it is possible to obtain similar results, if the work were repeated, in the same context, with the same methods and with the same or different participants.	The study should be reported in detail with details of the research design, data gathering and analysis, thereby enabling a future researcher to repeat the work.

According to Cohen et al (2011), research in general is deemed good if it provides rich evidence and offers credible and justifiable accounts (internal validity/credibility), can be made use of by someone in another situation (external validity/transferability), and the research process and findings can be replicated (reliability/dependability).

Other strategies for ensuring trustworthiness of qualitative studies include: member checks, peer reviews, and triangulation. The following strategies were used in the study design for enhancing trustworthiness:

(i)　　Full description of the conduct of the study has been provided in the dissertation so that readers could assess the validity and credibility of the work.

(ii)　　Researcher maintained good rapport with the participants.

(iii)　　*Member checks* of findings were undertaken.

For member checks, the researchers' interpretations of the data were shared with some of the participants who had opportunity to critically look at, clarify interpretations, and contribute new or additional perspectives on the phenomenon under study. Since the purpose of the study was to understand the phenomena of interest from the subjects' perspective, member checking is important because they are the only ones who can legitimately judge the credibility of the results.

(iv)   *Triangulation* of data sources, and findings was another strategy used to strengthen the credibility of the research process. Results from both quantitative and qualitative methods were compared in order to seek convergence, corroboration, and in-depth clarification of results from the two methods. Scholars (eg., Carter et al., 2014; Heale and Forbes, 2013) describe triangulation as a qualitative research strategy employing multiple methods or data sources to develop a comprehensive understanding of phenomena, and to assess validity via the convergence of information from different sources.

3.9   Pilot Study

The two instruments were pilot tested to ensure completeness and accuracy, as well as to establish its validity and reliability. Pilot studies in social science comprise trial runs done with a smaller sample in preparation for the actual study in order to test and ensure the validity of the study design to capture the required data, as well as to ascertain the reliability of the measuring instruments. It is an opportunity for the researcher to make modifications and revisions before going further, if found necessary. A pilot study is important in any research because it helps to test and ensure that the proposed methods will work as expected before being used in the actual survey.

In this study, three pilots were run: the questionnaire items, interview protocol, and the interview itself.   The questionnaire was pilot tested with a small convenient sample of four

respondents in order to ensure its validity and to check people's understanding and ability to answer the questions, and highlight areas of confusion. The need for a few changes was noted and was effected before posting it online for potential participants to access.

The interview protocol was also piloted with the first few participants. This process allowed the researcher as pointed out by Bryman (2012) to learn about issues such as timing, issues of interviewer inexperience and the possibility of asking leading questions and to alleviate any of these issues if found problematic. An important issue surfaced during the first interview was interviewee's discomfort over recording her responses using an audio device. Similar sentiments were shared by other interviewees also. Since it looked like an inhibition to expressing their honest opinions and beliefs, the researcher heeded to the interviewees' views, and he took notes using pen and paper only. It helped in creating conducive psychological environment in which he could collect accurate data. This also helped in improving the level of reliability of data.

In addition, the researcher used data from the first three interviewees as a pilot study to evaluate and ensure the reliability of the methods and procedures of data collection in order to be more efficient in collecting data from the full sample; some changes were made as a result of the outcome of the pilot phase. The coding exercise was also piloted using the first three interview responses as part of the analysis process in order to identify problems with the coding scheme and the researcher's ability to apply it.

3.10 Questionnaire Survey

The questionnaire was made available to the research population through web link available at https://goo.gl/forms/eSeEYA68mresYVma2. The link was sent to the target population by email; participants were expected to click on this link to open it and respond as required.

Questionnaire was completed only by 17 instructors and 43 students despite two reminders in a gap of two weeks. The survey outcome is provided in Appendix B. Pseudonyms (eg., STUD 1-43 for students and Staff 1-17 for instructors) were used to protect the anonymity of the interviewees. None of the 60 participants expressed willingness in the follow up interviews.

3.11   Interview Administration

The aim of the interview in this study was to elicit more details from the interviewees about their opinions of the ERP System in terms of problems encountered and their suggestions for improvement. The researcher made personal contact with participants in the convenience sample. He arranged with them for a conducive venue (that allowed sufficient privacy), date and time that were convenient to the potential interviewee. A copy of the informed consent form (Appendix C) that introduced the researcher, and the nature of the study being conducted was handed to them; it also explained the importance of the interviewee's participation for the validity of the research.

In all interviews, the interviewer began the interview by providing an overview of his purpose, the intended use of the interview data, and the measures he took to protect confidentiality and anonymity; the researcher used codes to protect the participants' identities. Also, he got the informed consent form signed by the interviewees. The core questions enabled the researcher to maintain consistency in all interviews. Each participant answered every question, some answering in more depth than others.

To make the interview session effective and successful, the researcher strived to create a relaxed, comfortable climate. The researcher noted all the responses verbatim on paper underlining points that required further probing before concluding an interview. Face-to-face interviews allowed the researcher to observe subjects' body language during discussions and

to gain access to subjective information. It also allowed the researcher to rephrase questions or provide additional information if necessary and clarify ambiguous points. At the end of the interview session, each respondent was asked to evaluate their overall sense of satisfaction with the ASAS. Each interview lasted (on average) 35-45 minutes.

Further, immediately after the interview, the researcher ensured that he has noted all the points from the entire interview, tried to fill in any gaps in his notes in the presence of the interviewee, and wrote down his whole impressions on the interview before he began another interview. In a couple of cases there were results that were contradicting the quantitative results;   in such cases follow-up phone calls were made to seek clarification or more information regarding the data collected; this process as pointed out by Kirk and Miller (1986) helped in enhancing the reliability and validity of the study. All the collected interview data were then summarised and collated according to the research questions in order to simplify the analysis of data. Data do not on their own answer the research questions. The following section discusses how data were analysed and interpreted for solving the research problem or to achieve the research objectives.

3.12   Data Analysis

Systematic analysis changes raw data into reliable findings or results. Data analysis was driven by both quantitative and qualitative methods. Both methods used mainly descriptive designs: Quantitative data were analysed using descriptive statistics while qualitative data were through content analysis which is a widely used qualitative research technique. Descriptive designs help us to simplify large amounts of data in a sensible and systematic way.

3.12.1 Statistical Analysis

It is pertinent to examine what system quality factors influenced the perceptions of the end-users, and how these variables influenced each other. It requires to determine the relationship of each system quality factor (independent variable) with the dependent variable (user satisfaction) and the inter-dependence of independent variables.

There are several methods of statistical analysis that can be used for comparing means of two variable sets; among them, the common ones are Mann-Whitney U test, Spearman coefficient of rank correlation, Pearson coefficient, analysis of variance, regression analysis, t-test, etc. Strictly speaking, Pearson correlation, analysis of variance, and t-test are parametric tests which require interval data with normal distribution. However, some experts (eg., Jamieson, 2004; Norman, 2010) are of the view that parametric tests can be used with Likert scale ordinal data even by violating statistical assumptions such as the requirement of a normal distribution of data. This is because parametric tests are generally more robust than nonparametric tests (Sullivan and Artino, 2013). The quantitative data in this study are ordinal in nature, and hence the variables are non-parametric. Paired samples t-test is considered most suitable for this study as it affirms the robustness required in the study. Parametric tests not only can be used with ordinal data, but they are generally more robust than nonparametric tests (Sullivan and Artino, 2013). An important requirement is that ordinal data must be summed up as a composite score either as a total score or mean score for the scale items, not individual items. To meet this requirement, the researcher used the mean score for each variable for every subject.

Using SPSS (Version 24), paired samples t-test was run for a sample of 60 participants in the questionnaire survey. The results are tabulated in Table 3 under section 4.2.2. Besides, descriptive statistic features of Mean and Standard Deviation for variable were computed.

The items measuring perceptions of quality dimensions and user satisfaction were measured on a five point scale with 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree; and, 5 = strongly agree. To aid in the interpretation of these scales, the researcher proposed an interpretation guide for the results as follows:

1.00 - 1.50   =   strongly disagree;

1.51 - 2.50   =   disagree;

2.51 - 3.50   =   neither agree nor disagree;

3.51 - 4.50   =   agree; and

4.51 - 5.00   =   strongly agree.

An ASAS system implementation can be successful if organisations manage the above mentioned quality dimensions effectively, and thus achieve a realistic return on its investment (RoI). According to Davenport (1998), an ERP implementation is considered successful if it achieves a substantial proportion of its potential benefits. From these backdrops, the researcher set a rating yardstick of a 3.75 to 5.00 range (equivalent to 75 − 100%) for a justifiable RoI.

3.12.2 Qualitative Data Analysis

The researcher typed the interview notes in MS Word format. Pseudonyms (eg., STUD 1-10 for students and STAFF 1-8 for instructors) were used to protect the anonymity of the interviewees. Content analysis is a research technique used to make valid inferences by interpreting and coding textual material. According to Hsieh and Shannon (2005), qualitative content analysis is a research method for the subjective interpretation of the content of text data through the systematic classification process of coding and identifying themes or patterns. The analysis of interview data was done based on inductive reasoning by which themes and categories emerged from the data through the researcher's careful examination and constant comparison. Based on the degree of involvement of inductive reasoning, Hsieh and Shannon discussed three 'approaches' to qualitative content analysis. They are:

(i)   *Conventional* qualitative content analysis: In this approach, coding categories are derived directly and inductively from the text data.

(ii)   *Directed* content analysis: In this approach, initial coding starts with an existing theory or relevant research findings as guidance for initial codes. Using existing theory or prior research, researchers develop the initial coding scheme prior to beginning to analyze the data (Kyngas & Vanhanen, 1999). Then, during data analysis, the researchers immerse themselves in the data and allow additional codes and themes to emerge from the data. It even helps in revising as well as refining the initial coding scheme.

(iii)   *Summative* content analysis: It starts with the counting and comparisons, usually of key words or content, then extends the analysis to include latent meanings and themes.

This study used *directed content analysis* approach in which coding categories were derived directly from the text data. This is because the researcher started with the four constructs (and their inherent attributes) adapted from the D&M Model which in turn allowed to create the coding units in advance. Subsequently the researcher looked for responses related to these constructs and their attributes in the text content.

As proposed by Creswell (2014), the researcher reviewed the interview data several times to ensure the accuracy of the themes and to enhance reliability. Data were coded manually[1] in accordance with specific items under each dimensional group (quality construct) and their components or user expectations. A code is a word or short phrase that symbolically captures a point that is relevant in the study. Each code was compared with all other codes to identify similarities, differences, and general patterns, and also with the themes from the literature review, strictly bearing in mind the objectives of the study (and those individual items in the

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[1]*Coding can be done either manually using with pen and paper or Microsoft Word or Excel spreadsheets or using software such as NUD*IST, NVivo, Atlas.ti, HyperRESEARCH, HyperQual, and Wordle. The coded nonnumeric data may also be given numeric coding and subjected to descriptive statistical analysis.*

questionnaire). Irrelevant pieces of information were discarded. Visual displays helped in formulating, linking and categorising codes, and it further assisted in a meaningful analysis.

In the final stage of analysis, these codes were tabulated, organised into appropriate categories to form themes, and interpreted by making logical associations with the questionnaire items, interview questions, research objectives and data that emerged from the literature review. From these, conclusions were drawn, and the findings have presented in Chapter 4. All possible efforts were made to minimise or even avoid researcher subjectivity and bias.

3.13   Ethical Considerations

Research ethics refer to the ethical considerations observed in the planning, conduct, and reporting of research. This study used two research instruments for data collection: a questionnaire and semi-structured interviews. The questionnaire was web-based; the participants could go through it and be fully aware of what they were going to respond to.

From the onset, participants were made aware of the purpose of the research to enable them decide whether to take part in the survey or not. It was also made clear to them that participation was voluntary; further, they were assured of confidentiality of information and anonymity of participants, meaning that their identities or personal details will not be disclosed to anyone, data gathered will be used only for research purpose, and any data used in the report will not be linked to any individual participant in the study. It was not compulsory for participants to provide their personal information, but was only optional to provide contact details for any possible participation in interviews. Further, it was made clear to them that they had the right to withdraw from the research anytime.

Nonetheless, from an ethical perspective, they were individually requested to sign an "informed consent" form (Appendix C) before they responded to the questionnaire. This form had been scrutinised and approved by the UB Research Ethics Committee. Also, data collected for the study were stored in the researcher' personal password-protected computer which could be accessed only by the researcher. On completion of the study, the data will be deleted from the computer.

In contrast to questionnaire surveys, participants in interviews may experience greater uncertainty and anxiety when taking part in interviews, particularly in informal and semi-structured interviews since the conduct of interviews cannot be pre-planned in the same way that structured interviews can, and further, interviews tend to be more personal in nature. Therefore, before the interview began, the researcher clearly explained how the interview process would evolve; that is, what would be basically asked (the basic interview questions were first discussed with the participants), and how new questions would evolve based on the responses from the participant for the researcher to develop new knowledge in the area of study. Further, the researcher assured the participants that he would interpret and report only what they actually said, and they had the right to withdraw at any time from the interview component of the study. Besides, the researcher was also ready to respond to any queries from the participants. These strategies helped the researcher build up a good rapport with participants, ease their anxieties, and made it easy to get informed consent.

Ethical approval and permission to conduct the research were obtained from the Office of Research and Development, and the UB Management. Copy of these letters can be found in Appendices G and H. The next section describes the limitations that might have affected or constrained the research methods and analysis of research data.

3.14 Limitations

This section highlights the limitations encountered and strategies undertaken to minimise its adverse effects of the study outcome.

(i) Low response rate in the questionnaire survey and hence the small sample size compared to the large target population for the quantitative component of the study. This was beyond the control of the researcher. However, this was addressed by giving less weightage to the quantitative component of the study; more weightage was given to the qualitative component where the subjects identified through convenience sampling coupled with the criterion of data saturation constituted a good sample for the interview. The procedure undertaken has been further discussed under section 3.6.

(ii) The literature available was mostly from developed countries and had little relevance to the study context.

(iii) Unexpected time constraint was another limitation, particularly due to unexpected delays in getting ethical clearance from the UB Office of the Research and Development and research permit from the UB Management. The researcher could start data collection only after obtaining a research permit which took too long in the case of this study. Although administering paper-based questionnaires was an alternative strategy to address the low response rate in the online questionnaire survey, time constraints did not allow the researcher to take that route due to time constraints.

(iv) This study used self-reported data to assess user perspectives. In an organization, individual behaviours are likely to be influenced by contextual factors, such as organizational climate and culture, and individual biases. Some of these contextual as well as human factors might have influenced other factors.

(v)   As the researcher is a member of the IS related service delivery unit, the openness of some participants might have been limited by fear of the researcher in case he disclosed any of their sensitive feelings and opinions in a manner that might be detrimental to them. These limitations were not under the control of the researcher.

Finally, owing to the researcher's knowledge and experience in the IS sector and a possible inherent bias, the researcher tried his level best to avoid any misjudgements in drawing conclusions. He was extremely careful in keeping an open mind about the data and findings, and in not making quick judgements based on the first few responses.

3.15   Summary

This chapter has described and justified the research methodology of this study. It provided a general discussion of the three research philosophical paradigms (Positivism, Interpretivism, and pragmatism), the two popular research methods (qualitative and quantitative methods) and their role in social research. It then discussed the rationale for the choice of pragmatism as the study's research philosophy, qualitative methods and quantitative methods combined as the research approach and interpretive case study as the research strategy. Pragmatism provided the necessary flexibility demanded by the research problem and permitted the researcher to make changes appropriately during the course of data collection.

It further provided a full description of the case study design for the study. It highlighted all research procedures, research population and study sample, data collection tools, data collection and analysis methods, and procedures for ensuring reliability and validity of quantitative data, the trustworthiness of qualitative findings and maintaining ethical standards within a qualitative case study framework. Pilot tests were run to ensure that the instruments were reliable for gathering accurate data. Descriptive analysis of the survey data and interview responses were

undertaken and discussed. Cronbach's alpha was used to determine the reliability of the main constructs of the adapted model. The next chapter will discuss the results of the study, with special reference to how the quantitative and qualitative findings were used to draw final conclusions.

CHAPTER 4: RESULTS

4.1   Introduction

The previous chapter discussed and justified the research methodology of this study. It highlighted all research procedures, research population and study sample, data collection tools, data collection and analysis methods, and procedures for ensuring reliability and validity of quantitative data, the trustworthiness of qualitative findings and maintaining ethical standards within a qualitative case study framework. This chapter provides a summary of the results and findings gathered from the questionnaire survey and semi-structured interviews.

The primary objective of this study was to determine user perceptions of the performance of ASAS in its post implementation phase in UB. Secondly, the study examined what factors might have had direct or indirect influence on the perceptions of end-users of UB ASAS in its post-implementation phase. The study used a web-based questionnaire and interviews to achieve the research objectives.   The outcomes from the survey that comprised items around the independent variables about the three ASAS quality constructs (service quality, system quality, and information quality), and dependent variable (user satisfaction) were analysed. Tables and descriptive statistics are included to illustrate the survey outcome of the three quality constructs, and the dependent variable (user satisfaction). The results of all of the interview analysis were employed in conjunction with descriptive analysis results and presented without any bias or judgement. The findings from both quantitative and qualitative phases are presented by constructs first, then compared and subsequently presented by the research objectives.

4.2 Statistical Analysis and Findings

The statistics used in the study are descriptive and paired samples t-test statistics.

4.2.1 Descriptive statistics

The mean and standard deviation of each construct are presented in Table 1 below. Interpretation of the mean values based on the interpretation scale proposed in Chapter 3 has also been provided in the table.

Table 1: Descriptive statistics

	Mean	SD	N	Position of Men in the SD – SA range
System Quality (SYQs)	2.91	0.49	60	Neither agree nor disagree
Information Quality (IFQs)	3.71	0.45	60	Agree
Service quality (SVQs)	3.50	0.48	60	Neither agree nor disagree
User satisfaction (USF)	3.98	0.75	60	Agree

Information Quality (mean = 3.71) and User Satisfaction (mean = 3.98) are perceived as "Agree", while System Quality (mean = 2.91), and Service Quality (mean = 3.50), as "Neither agree nor disagree". The System Quality has the lowest mean (2.91), while Information Quality has the highest mean (3.71), though it is less than the 3.75 to 5.00 range (equivalent to 75 – 100%) proposed in Chapter 3 for achieving a realistic return on its investment (RoI).

The standard deviation values indicate how the data are dispersed around their mean values. User satisfaction has the highest standard deviation (0.75); the ASAS quality factors have more of less the same SDs that fall in the range of 0.45- 0.49. The relatively high SD value of user satisfaction means that users have varying perceptions based on their expectations under each quality construct. In order to get a better understanding of the results, the mean values of each item (user perceptions based on their expectations) were tabulated for detailed examination as in Table 2 below. These item-based mean values help to understand users' specific needs based on their perceptions.

Table 2: Item-wise mean scores

Item		Mean	Interpretation
1. System quality			
(i)	ASAS was always available.	2.15	Disagree
(ii)	ASAS was user friendly.	2.48	Disagree
(iii)	I could easily navigate the ASAS interface (It was easy to find and use all the links/menu).	3.27	Neutral*
(iv)	ASAS was easy to use.	2.92	Neutral*
(v)	ASAS was a secure system (The system is password protected; unauthorised persons had no access to others' information.)	3.53	Agree
(vi)	ASAS responded to my requests quickly	3.12	Neutral*
	Mean	2.91	Neutral*
2. Information quality			
(i)	The output information of ASAS was easy to understand.	3.43	Neutral*
(ii)	ASAS output was always accurate.	3.75	Agree
(iii)	ASAS always provided up-to-date information.	3.98	Agree
(iv)	ASAS output was always reliable.	4.08	Agree
(v)	Information content from ASAS met adequately all my needs as a student/ an instructor.	3.73	Agree
(vi)	ASAS output was well presented.	3.30	Neutral*
	Mean	3.71	Agree
3. Service quality			
(i)	There was adequate training by IT support personnel on the use of ASAS.	3.05	Neutral*
(ii)	I got prompt response from IT support personnel whenever I needed assistance.	3.93	Agree
(iii)	The ASAS support team comprised knowledgeable persons.	3.16	Neutral*
(iv)	When I had a problem with ASAS, IT support personnel solved it.	3.58	Agree
(v)	Services from the IT support personnel were always dependable. They delivered what they promised to deliver.	3.68	Agree
(vi)	IT support personnel listened to my problems patiently and were always courteous to me.	3.57	Agree
	Mean	3.50	Neutral*
4. User satisfaction			
	Overall I am a satisfied user of ASAS that is currently in use at UB.	3.98	Agree

*Neutral = Neither agree nor disagree;

4.2.1.1   Findings on System Quality

The D&M model hypothesised that the following user expectations (for successful performance of ASAS) around system quality: 'system availability and stability', 'user friendliness', 'ease of navigation', 'ease of use', 'security of the system' and 'response time'. The six items under 'system quality' represent each of these attributes/ end-user expectations. Perceived rating of these expectations and their overall rating are pictorially represented in Figure 1 below.
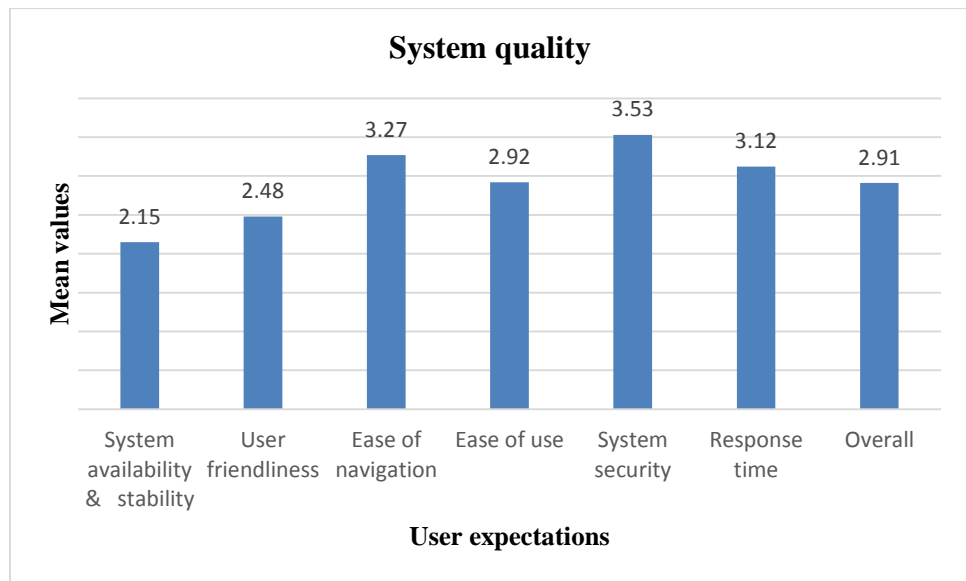
Figure 1: Perceived mean values of user expectations of system quality

The overall mean (= 2.91) for System Quality positioned itself in the "Neutral" range. The feature that users appreciated the most was the security of system (Mean = 3.53), but were not satisfied with were its availability and stability (Mean = 2.15), and user friendliness (Mean = 2.48). However, they took a neutral position with regard to ease of navigation, ease of use, security and response time.

4.2.1.2   Findings on Information Quality

Concerning the components of Information Quality, the model hypothesised the following factors to have positive impact on the overall user perceptions: 'ease-of-understanding', 'accuracy', 'currency', 'reliability', 'adequacy', and 'good presentation' of the output. The six items under 'information quality' represent each of these attributes/ end-user expectations. Perceived rating of these expectations and their overall rating are pictorially represented in Figure 2 below.

Figure 4.2: Perceived mean values of user expectations of information quality

The overall mean (= 3.71) for Information Quality positioned itself in the "Agree" range. The results showed that they were satisfied with reliability, accuracy, accuracy, currency, and adequacy of the system output, the most appreciated being the reliability of the system output (Mean = 4.08). These findings indicated that ASAS helped them with accurate information to take decisions in a short time. However, they took a neutral position with the way the output was presented (Mean = 3.30) and its ease-of-understanding (Mean = 3.43).

4.2.1.3 Findings on Service Quality

The model hypothesised that the following service quality factors had a positive impact on overall user perceptions of the system performance and success: 'adequacy of training', 'promptness in responding to support calls' from users, 'expertise of support personnel', 'addressing problems' effectively, 'dependability' and 'empathy'. The six items under 'service quality' represent each of these attributes/ end-user expectations. Perceived rating of these expectations and their overall rating are pictorially represented in Figure 3 below.

Figure 3: Perceived mean values of user expectations of service quality

The overall mean (= 3.50) for Service Quality positioned itself in the "Neutral" range. The feature that users appreciated most was the prompt response that users got from the support personnel (Mean = 3.93); they were also satisfied with their way of effective addressing of problems (Mean = 3.58), dependability (Mean = 3.68) and empathy (Mean = 3.57). However, they took a neutral position with adequacy of training (Mean = 3.05), and expertise of the support personnel (Mean = 3.16).

4.2.1.4 Findings on User Satisfaction

User satisfaction had a mean value of 3.98 which positioned itself in the range of "Agree" based on on the interpretation scale proposed earlier. It is an indirect measure of system success and in turn, an indicator of organisational net benefits.

4.2.1.5 Graphical Presentation of Mean Values of Constructs

The perceived mean values of dependent and independent variables are presented graphically below.
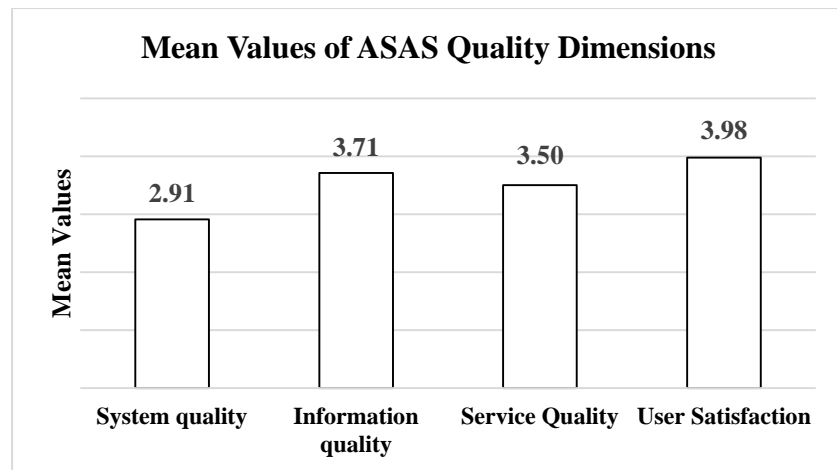
Figure 4: Perceived mean values of ASAS quality dimensions

Among the three quality constructs, system quality had the lowest rate (2.91 in the Neutral range), meaning that this required the maximum attention. This can probably be best explained by the complexity of the system, and occasional challenges around availability of ASAS (Mean = 2.15) especially when the usage is high in the beginning and end of a semester.

4.2.2   Paired samples t-test of means

Paired samples t-test of all the four variables (three independent quality constructs and the dependent variable user satisfaction) was carried out using SPSS (Version 24). The Paired samples t-test compares the means of two variables that are from the same individual or group.

The quantitative survey in the study provided data to indicate each end-user's perceptions towards the three system quality factors and gauged their perceptions of system performance. The results have been presented in Tables 3 below. The mean score of all the attributes/ items under each variable for each individual subject was used for the t-test analysis.

Table 3: Paired samples t-test of means

Variables	Mean	Std. Deviation	t-value	Probability (2-tailed)
System quality & User satisfaction	-1.07	.83	-10.03	.002*
Information quality & User satisfaction	-.31	.73	-3.26	.002*
Service quality & User satisfaction	-.49	.77	-4.88	.000*
System quality & Information quality	-.76	.63	-9.45	.000*
Information quality & Service quality	.18	.53	2.60	.012*
System quality & Service quality	-.59	.52	-8.76	.000*

$*p < 0.05$

The paired samples t-test found:

(i)   System quality had a significant influence of user satisfaction as $p = .002$ is less than alpha at .05 level of significance.

(ii)   Information quality had a significant influence of user satisfaction as $p = .002$ is less than alpha at .05 level of significance.

(iii)   Service quality had a significant influence of user satisfaction as $p = .000$ is less than alpha at .05 level of significance.

(iv)   There was a significant relationship between system quality and information

quality as p = .000 is less than alpha at .05 level of significance.

(v)   There was a significant relationship between information quality and service

quality as p = .012 is less than alpha at .05 level of significance.

(vi)   There was a significant relationship between system quality and service quality as

p = .000 is less than alpha at .05 level of significance.

These findings validated the influence of three system quality factors (system quality, information quality and service quality) on user satisfaction as postulated by DeLone and McLean, and thus, give credence to the D&M model's constructs and their interrelationships. However, the findings do not vouch for the influence of 'system use' and 'net benefits' with 'user satisfaction' as these two variables were not included in the model adapted for this study.

4.3   Qualitative Analysis and Findings

As discussed in Chapter 3, the qualitative analysis involved categorising the findings according to the three quality dimensions and their components/ attributes as the first step for the coding process. The frequency of actual words and their synonyms used by interviewees in response to questions helped to identify patterns and relationships, and to identify the most significant themes valuable in the study.

The analysis of the interview responses revealed a number of interesting findings which in general supported the quantitative survey findings; further, it also helped to explain those numerical ratings from the questionnaire survey as it could elicit in-depth details from the participants. The main insights from the 18 interviews are presented below whereas the interview transcripts are presented in Appendix E.

4.3.1 Findings on System Quality of ASAS

Among the three quality constructs, 'system quality' was the least satisfied dimension of the UB ASAS according to interviewees. It has bearing on availability and stability, user friendliness, ease of navigation, ease of use, security and response time. However, most users were fairly satisfied with some of its components such as user friendliness, ease of navigation, ease of use, security and response time in comparison with the legacy system. The aspect that users were most concerned about was the ASAS availability and stability; regarding this, half the interviewees indicated that sometimes the system either tended to be very slow, froze or was not available at all when it was most needed. UB has a state-of-the-art technology behind the ASAS, and therefore, such student concerns need to be investigated in depth to understand the causes and to address them.

4.3.2 Findings on Information Quality of ASAS

Over all the highest user satisfaction recorded in the interviews was for 'information quality of ASAS. This was also supported by the quantitative results where this construct had the highest mean score of 3.71. Interviewees were generally satisfied with all the attributes of information quality which included ease-of-understanding, accuracy, currency, reliability, adequacy, and good presentation of the output. Some interviewees expressed their appreciation of ''error-free'' system performance, while others were either neutral or were with negative perceptions. Those with positive perceptions opined that the ASAS output was useful, relevant for decision making, and easy-to-understand.

However, a concern expressed by some students is about the difficulty they sometimes faced on their course selections, that is on choosing suitable electives and options some of which clashed with core subjects on the timetable. As a result, it was hectic for them to get it sorted

out because of the unavailability of effective provision for 'personal tutor service' which was available before the introduction of ASAS. The need for high information quality is critical as it associated with high organizational impact. Information quality can still be improved in several ways, and it would be discussed under recommendations in the next chapter.

4.3.3   Findings on Service Quality of ASAS

Service quality is associated with adequacy of training, promptness in responding to support calls from users, expertise of support personnel, addressing problems effectively, dependability and empathy. Service quality was an important area of concern for the respondents due to its great role in their successful hassle-free use of the system in terms of how quickly and accurately the technical team responded to user enquiries. Some respondents felt that they were not adequately trained and so they could not use the system correctly.

A shocking observation made by instructors was about "missing marks"; according to them, they entered their students' exam marks, but noticed in the next log in time that some of those marks were then not there. This could be either due to a system fault or incorrect use of the system; this has to be further investigated by the ASAS Managers.

Students generally found the use of ASAS as something difficult; two of them used the Setswana word "mathata" which implied that the system is "difficult or a problem". As a result, they preferred to do online programme registration and course enrolment (required in the beginning of a semester) while an IT technician is at their reach for help. On probing further, the researcher could figure out that it was simply their lack of confidence with the system. According to them the process of finding needed information was often too time consuming.

Most interviewees recommended the need for more systematic training and support to users in terms of reliability, responsiveness, assurance, and empathy. The researcher supports this view and further recommends the urgent need for post-training one-on-one support across the organisation for both students and instructors. With improved training, chances of users becoming frustrated and getting errors are lower, or in other words, it could lead to better information quality. Conclusion from the above discussions is that if all the quality factors quality could be improved, the users would be much more satisfied with the ASAS.

4.3.4   Findings on User Satisfaction of ASAS

Analysis of the interview responses indicated that the interviewees were generally satisfied with the ASAS performance. The majority of users appreciated that ASAS in UB has great potential and was a good investment, but opined there was still much to achieve from it. Currently there was a gap between user expectations and perceived performance under all the three quality dimensions. For example, all the interviewees were of the view that there should be considerable improvement in the attributes particularly those underlying system quality and service quality; these attributes include system availability and stability, user friendliness, ease of navigation, ease of use, response time, training, promptness in responding to support calls from users, expertise of support personnel, addressing problems effectively, dependability and empathy.

Further, all instructors emphasised the urgent need for linking ASAS with the Learning Management Systems (Blackboard and Moodle) and the financial system module of the ERP. Instructor interviewees noted with great concern a drawback of ASAS to handle the processing of supplementary exams and grades without hassles. Students expressed concerns over long queuing up for "unblocking" their accounts prior to registration because it could have been avoided if there was communication between ASAS and the financial module.

4.4 Triangulation and Integration of quantitative and qualitative results

Findings from quantitative and qualitative methods were compared and triangulated. Interestingly, the results from both methods were found to be close to a great extent. For example, the correlation between the three IS quality variables and user satisfaction level from both methods more or less similar; from the quantitative, the researcher found a significant positive correlation between the system quality constructs and user satisfaction; the similar sentiment was heard from the qualitative side though there were some variations within the range of satisfaction and dissatisfaction; these variations in the qualitative part could provide rich explanation to why even satisfied users gave different ratings within the same range (eg., a score of 4 and 5) or dissatisfied subjects with 1 and 2 to different attributes (underlying the ASAS quality constructs) in the questionnaire survey. Therefore, the results from the two methods were integrated and summarised as below in relation to the research questions:

4.5 Response to research questions

The first research question was: *How do end-users of UB ASAS perceive the system performance in its post-implementation phase?* The quantitative results indicated an average rating of 3.98 on a five-point Likert Scale. Based on the interpretation scale proposed earlier by the researcher, 3.98 is somewhat close to the mid-value of the "Agree" range of 3.51 – 4.50. Interview results also indicated that end-user perceptions heavily depended on the system quality factors/ variables. The paired samples t-test findings also indicated that the user perception had significant bearing the three quality factors.

The significant rating of user satisfaction in the quantitative side was also fully supported by the interview outcome. Further, users' mean rating to the questionnaire survey item, "Information content from ASAS met adequately all my needs as a student/ an instructor" was

3.73, equivalent to an "Agree" rating. This point about meeting user needs also was posed to the interviewees in question form to seek their views. Their response also supported "Agree" rating from the quantitative side. The conclusion from the above is that the users were satisfied with the ASAS performance. From this numerical rating of 3.73, it is evident that the users were satisfied but not *very* satisfied with the ASAS performance on a scale of 1 to 5 based on the interpretation guide proposed earlier by the researcher in section 3.12.1. This was also evident in users' comments during interviews that there was still room for improvement.

From Table 2, the most significant independent variable which users appreciated most was information quality dimension (mean = 3.71) followed by service quality (mean = 3.50). This finding is line with some past studies (eg., Jen & Chao, 2008; Choi et al., 2013). From the interview responses, this was probably because if the information output was accurate, the number of mistakes, misunderstandings and information gaps would be minimal or even nil. They also indicated that the satisfaction they derived when they got the expected outcome on the screen against a user input without any hassle is unremarkable. This is particularly true when students attempted to choose optional subjects; the system did not allow them to choose two optional subjects if they were scheduled to be at the same time on the timetable. However, it has to be noted that the literature varied on the findings of the relative significance that end-users attribute to the quality dimensions; for example, in studies conducted by Ojo (2017) and Choet al., (2015), it was the system quality that most significantly influenced the use of a hospital information system.

In addition, interviewees were of the view that information accuracy, currency, reliability, and adequacy in meeting needs, all with mean values in the "Agree" range (3.51- 4.50) were more important than the other ASAS attributes; the level of accuracy determined the level of reliability of the information provided by the system. Other contributing factors came from the

other two system quality and service quality variables; both quantitative and qualitative findings were in support of this conclusion; the specific factors under system quality and service quality that contributed towards system success are: system security, promptness in response from IT support personnel, quality of IT support, dependability of support and empathy from IT support staff though they could still be improved.

The second research question was: *What are the factors that might have had direct or indirect influence on the perceptions of end-users of UB ASAS in its post-implementation phase?* The researcher took efforts during interviews to probe and identify possible contextual variables that could be considered critical to the success of the ASAS in its post-implementation phase. All user expectations listed under the three ASAS quality dimensions were not rated that high as one would expect or in other words, they were not fully met. They cannot be ignored considering the huge investment on the system. In response to the second research question, the organisational factors that needed attention are as discussed below.

4.5.1 Organisational factors with influence on ASAS performance

Based on the interview responses of the subjects, the following factors were identified as having some impact on the ASAS performance and hence, on user satisfaction.

(i)   *Inadequate user training and support*

According to interviewees, the need for more effective training and post-training support in a technology innovation cannot be overemphasised; only with proper training, users will be able to use the system correctly particularly with the aspect of data input which is essential for the system to output accurate and reliable results. Managements and ASAS managers often do not attempt to identify the users' changing needs or sometimes underestimate the need for training, re-training, and effective post-training support. Occasional survey among system users can help

identify their needs and also problems with the system, and address any issues immediately as they occur.

(ii)   *Leadership and Organizational Change Management*

As the ERP/ASAS system was altogether a new phenomenon in terms of system complexity and familiarity, it was obviously considered a major change in the UB environment. Implementation of complex ISs is often considered a disruptive process that relates to several aspects of an organisation. According to Abbas (2011), "the structures of the universities are very rigid and resistant to change, so the focus is on the change of processes, not technology". This meant that the deployment of an IS might cause considerable changes in organisational culture, and it is more than a technological challenge. According to Hornstein (2008), in IT implementation it is critical that management follow through on the key change enablers: organizational structure, policies, information dissemination, training and development, performance evaluation and recognition. This is essential to continue the momentum generated in any change initiative. An effective leadership that is willing and capable of bringing about considerable attitude change and building up motivated users across the entire organisation is crucial. In this sense, the role of top management was critical to plan and manage the change, and to fully tap the potential of the new system.   However, according to instructors, there was not adequate support from the top management; everything was according to the whims and fancy of the IT department that imposed the system on the users without any choice.

(iii)   *User resistance*

Although user resistance is common in technology innovation environments, interestingly in the UB context, no indication of any resistance issue among any of the interviewees was found;

however, a displeasure on the mandatory nature of the system as a whole was sensed. The management was determined to replace the legacy system with the new system obviously for good reasons.

(iv) *Organisational culture*

The successful implementation of an IS can be affected by the organisational culture. If the IS processes do not fit with traditional cultural practices, success could be in question. Therefore, what is successful in one culture may not be so in another culture. Parr and Shanks (2000) reported that strong considerations need to be given for national cultural issues, since critical success factors may vary significantly from one country to another. In this connection, a notable point in the UB context is that the use of ASAS is compulsory for all staff and students for accessing most of the institutional services. Therefore, users had no option other than accepting it and making it part of their daily business processes.

(v) *System customisation and modification*

Since organisational structures can be different from one organisation to another, its needs can also be different. As a result, packaged off-the-shelf IS applications will require some degree of system customisation or additional modules in order to match the specific functions and processes of an organisation. For example, the original ASAS of UB did not have a provision to process supplementary exams. Although a supplementary module was later added (as gathered from ASAS support staff), interviewees noted with great concern its effectiveness was not as much as if it were an integral part of the ASAS system. As a result, other processes such as student online registration of programmes and courses had to be closed while supplementary exam processes were underway. This was brought up by some instructors and students as a serious concern. To be specific, they indicated that although UB reopened on the 09 January

2017, students could not do online registration of programmes and courses for a week as the system was only open for supplementary exam processing.

According to users, two other important areas that required customisation or modification are related to linking the financial system and LMSs with ASAS. Establishing such links could probably completely avoid the need for the so called 'unblocking' of student accounts which was considered by students as serious inconvenience and waste of time. In the same vein, instructors considered the lack of such links as a serious draw back.

4.6   Summary

The aim of the study was to investigate if the end-users of ASAS were satisfied with the system performance and to identify factors that might have had influence on the ASAS users' perceptions in its post-implementation phase. In order to achieve this aim, quantitative and qualitative methods were used to gather data which were then analysed. The results were triangulated for comparison, trustworthiness and understanding of phenomena, and to assess validity via the convergence of information from the two sources.

The findings indicated that users were fairly satisfied with the system performance. Although majority of users commented that the ASAS had great potential and was a good investment, they opined that there was still much to achieve from it. A major concern of users was about the interoperability of ASAS with other systems such as LMSs and the financial system module of the ERP.

The next chapter will explore these results in more detail and examine the links with the literature in order to draw final conclusions and recommendations.

CHAPTER 5: DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

5.1   Introduction

The previous chapter presented results of the study from the two methods. This chapter initially provides an overview of the research, and a review of the findings. It then discusses the significance of the findings by comparing with prior studies, and draw relevant conclusions with practical recommendations for improvement. In addition, it presents the study's theoretical and practical contributions to the research field, its limitations, and scope for further research that may be conducted based on the findings of this study.

5.2   An Overview of the Study

Objectives of this study were to:

(i) Investigate end-user perceptions of the performance of UB ASAS in its post-implementation phase; and,

(ii) Identify any factors that might have had direct or indirect influence on the perceptions of end-users of UB ASAS in its post-implementation phase.

The study was guided by the Delone and Mclean IS success evaluation model. Predominantly this was an interpretive qualitative study; there was also an element of quantitative approach to the study in order enhance the trustworthiness of the study. The results from the two methods were triangulated and integrated to draw conclusions. An online quantitative survey was first administered online among the entire UB students and their instructors. However, only 60 participants that included 43 students and 17 instructors responded to the survey despite two reminders. Subsequently, semi-structured interviews based on questionnaire items and participant responses were conducted among a convenience sample that was carefully selected based on the criterion of 'data saturation'. Interviews helped the researcher to get rich descriptions to the numerical responses of 1 to 5 representing strongly disagree, disagree,

neutral, agree and strongly agree respectively in the quantitative survey. Results indicated that the qualitative findings were in strong support of the numerical results from the quantitative phase. The results also gave insights into what quality dimension(s) and its components that users did or did not appreciate, and which ones needed attention.

5.3   Summary of Findings and Related Discussions

The responses from interviews more or less matched with quantitative findings, and it further helped to get rich descriptions to those numerical ratings from the questionnaire survey. The results were discussed in section 4.4. A summary of the results and related discussions are presented below.

(i)   In line with the first research objective, the study found that the end-users were satisfied with the ASAS performance. This is an indication of a productive use of the system which in turn could enhance organisational net benefits. However, subjects felt that there was still room for improvement by taking adequate steps to address those challenges and concerns raised by them with regard to the system's three quality factors and certain organisational factors (discussed in sections 4.5.1 and 5.6).

(ii)   The quantitative component of the study indicated that the three quality constructs had significant influence on the user satisfaction and they were also significantly inter-related. Their influence on user satisfaction was well supported in the interview outcomes.

(iii)   Based on the study outcome, several ASAS-based as well as organisational factors that affected end-user perceptions of ASAS performance were identified and discussed in section 4.4. These results are summarised below in line with the second research objective.

(a)   ASAS-based factors

(i)   End-users did not appreciate all three quality constructs of the ASAS at the same level. The least appreciated was its system quality which has bearing on system availability and stability, user friendliness, ease of navigation, ease of use, security and response time. End-users were particularly concerned about system availability and stability especially in the beginning and end of a semester, and it needs major attention by the ASAS managers.

(ii) Though not as bad as the system quality, the other quality construct that got low appreciation by end-users was the service quality which is a cluster of adequacy of training, promptness in responding to support calls from users, expertise of support personnel, addressing problems effectively, dependability and empathy. Their main concern was over adequacy of training; both instructors and students suggested the need for more effective training, re-training, and post-training one-on-one support.

(iv)   The most satisfied ASAS quality factor was its information quality which comprised ease-of-understanding, accuracy, currency, reliability, adequacy, and good presentation of the output. Most of them expressed their positive perceptions of ''error-free" system performance. End-users were generally satisfied with all attributes though comments on some of them were not as high as one would expect from such a huge investment; for example, three student subjects had concerns on aspects of 'ease-of-understanding' (Mean = 3.43) and 'presentation of output' (Mean = 3.30). The average rating was only 3.71 on a scale of 1 to 5. Two students reported that they sometimes faced difficulty during course selection, that is on choosing suitable electives and options. From the part of instructors, there was a concern of "missing marks". The need for high information quality is critical as it associated with high organizational impact. Information quality can be improved in several ways, and it has been discussed under recommendations (section 5.6).

By understanding these relative ratings, ASAS managers may allocate resources accordingly or plan for an effective IS quality management strategy. By this argument, in the UB context, the most attention should be given to the aspect 'system quality' followed by 'service quality', and then 'information quality'. The project leadership has to take note of the poor rating of the system availability and stability (under system quality) because it is rated in the 'disagree' range and is the lowest among all the 19 items. The same applies to the system's 'user friendliness' which is also rated in the 'disagree' range. These two attributes are integral components of ASAS 'system quality', and they have to be improved.

Due to the inter-relatedness of the three quality dimensions, action taken to enhance any one IS quality would positively impact the other two quality attributes and subsequently improve organizational benefits. For example, system quality indirectly can enhance the quality of information processing and hence the quality of output / information (if the user input was in order). If system quality was poor, it is unlikely for the service quality and information quality to improve considerably.

To enhance service quality, the technical staff must be trained and motivated to be more service oriented particularly in line with user training and expertise with ASAS. They should also be more prompt in responding to calls for support from users, and addressing problems effectively; they should also be dependable and empathetic to ASAS users. ASAS was not adequately programmed/ customised for processing supplementary exams; as a result, there was interruption in the use of ASAS by students and instructors while the academic services unit was processing the supplementary exam results. ASAS managers should attend to it as a matter of urgency. In addition to the system-based challenges, the study also identified five

organisational factors that might have had adverse impact on the ASAS post-implementation environment. They are summarised below.

(b)   Other organisational factors

In general, the organisational factors that influenced the normal operations of ASAS adversely in UB were certain user expectations that were not fully met, inadequate user training and support, poor leadership and organizational change management strategies, imposition of the system on users without any alternatives, and system customisation that necessitated as a result of the introduction of supplementary exams. These were discussed in detail under section 4.4.

5.4   Research findings versus the literature: a comparison

According to DeLone and McLean's (1992, 2003, 2004) widely-cited and commonly-used IS success evaluation model, three IS quality factors- system quality, information quality and service quality- are required to achieve success in the post-implementation phase of an IS. In support of this model, the quantitative component of this study found that there was significant influence of the three quality dimensions on user satisfaction. This finding is in line with the outcome of many past studies (eg., Thilahun &Fritz, 2015; Cho et al., 2015; Bossen, Jensen & Udesen, 2013). This was well articulated in the responses of interviewees in this study.

The literature (eg., Chung et al., 2015; Dwivedi et al., 2013; Ganesh & Mehta, 2010; King, 2003) highlights that many ERP System implementations have failed and caused huge waste of valuable resources because they did not achieve the expected objectives. Therefore, it can be concluded that UB's investment did not go down the drain. However, the interviewees suggested that there is still room for improvement. There is need for ASAS managers to conduct occasional survey to understand users' changing needs and support them accordingly.

In this study, the most appreciated quality construct was the 'information quality' dimension followed by 'service quality'. This is line with some past studies (eg., Jen & Chao, 2008; Choi et al., 2013; Tilahun & Fritz, 2015); however, the literature varied on variable significance this from one context to another (eg., Jen & Chao, 2008; Choi et al., 2013); in some other studies, service quality followed by information quality and then system quality was the order.

From the interview responses, the researcher noted that the preference for 'information quality' dimension in the UB context was probably because if the information output was accurate, the number of mistakes, misunderstandings and information gaps would be minimal or even nil. They also indicated that the satisfaction they derived when they got the expected outcome on the screen against a user input without any hassle is unremarkable. This is particularly true when students attempted to choose optional subjects; the system did not allow them to choose two optional subjects if they were scheduled to be at the same time on the timetable.

According to the literature (Chung et al., 2015; Dwivedi et al., 2013; Ganesh & Mehta, 2010; King, 2003), the most common organisational factors impacting system success included, but not limited to, user training, organizational change management, user resistance, system customisation and organizational culture. These factors, except user resistance, were found to be relevant in the UB context also. The literature (Bateh et al., 2013; Carlstrom & Ekman, 2012) indicates that negative attitude and resistance to technology innovation by users is common because implementing an IS is a major cultural change for any organization. However, no trace of any user resistance was evident in the interview responses except a displeasure against the mandatory use of ERP/ ASAS.

5.5 Practical Implications of the Study

This study was conducted to evaluate end-user perceptions of the performance of ASAS in its post-implementation phase. Having spent millions of Pula on a new system, a study of this nature was pertinent in order to evaluate its success and address any issues as early as possible in order to improve return on investments. Therefore, this was basically an evaluation study in the context of UB. It is hoped that the ASAS managers of UB will make use of the results of this study, and will allocate scarce resources according to needs and thus, plan for effective quality management strategies to meet user expectations. Based on the findings in the UB context, priority should be given to system quality, followed by service quality and then information quality. In terms of hardware and software, UB has state-of-the-art technology; what bothers the users are mainly its failure in availability and stability, slowness and freezing of the system especially during exam times, and lack of user friendliness.

An interesting point to note is that the fairly good user-rating of the system in its post-implementation phase is an indication of its successful implementation (at hardware and software level); success in the post implementation cannot be achieved without success at the technology implementation stage. These inferences indicate that all in all, the people involved, the technological factors and related processes around ERP System implementation in UB went well. However, further research is needed to investigate whether UB is achieving its targets and desired outcomes as expected from such a huge investment.

5.6   Recommendations

The user-rating of the three quality dimensions were not that high as one would expect considering the huge investment on the system. The least appreciated by users about ASAS was its system quality; the next better one was service quality, and then information quality the best.

It means that they all have to be improved considerably; given limited resources, higher priority should be given to ASAS's system quality followed by service quality, and then information quality. The following recommendations are mainly based on interview outcomes.

(i)   Two important user expectations that users raised concerns about are under ASAS's 'system quality'; they are its 'availability and stability' and 'user friendliness'. These concerns need urgent attention from the ASAS managers. The system should be available and stable whenever it is needed; in this regard, a more stable, reliable intranet and internet connectivity may help address this problem. Further the system should be much easier to use than it is now, particularly with regard to menus, user interface, page layout, and navigation.

(ii)   In order to enhance service quality of ASAS, more emphasis should be placed on user training and in providing prompt, active support which in turn required IT training staff to render better attitudes towards service orientation. Further, user training and support should not be a one-time job, instead it should be continual; there should be provision for training, re-training, post-training support on one-on-one basis, occasional refresher programmes, and the like. This view is further supported by Davenport et al., (2004) who suggests that post-implementation training has a positive effect on all aspects within the organisation. In order to understand users' changing needs, regular meetings and surveys may be quite beneficial because users could raise issue through these avenues. Appropriate end-user training may help to enhance user satisfaction, and maximise organisational benefits.

(iii)   There is an urgent need for linking ASAS with the Learning Management Systems (Blackboard and Moodle) and the financial system module of ERP. Lack of interoperability between ASAS and other UB systems was a serious concern of both students and instructors. It can greatly minimise lot of inconvenience to both students and instructors. Currently, students

have to spend their valuable time in long queues for the so called "unblocking" of their accounts before they could register/ enrol in programmes and courses. The need for unblocking could have been avoided if there was communication between ASAS and the financial module.

(iv)   As part of the change management strategies, the management must try to develop and promote a learning culture in which instructors and students tend to consider self-development as a personal responsibility; it is essential to enhance confidence with the system and perform more effectively.

(v)   As long as supplementary exams are on UB's agenda, ASAS has to be appropriately modified or customised to handle the processing of supplementary exams and the provision of online registration of programmes and courses concurrently in the beginning a semester.

(vi)   The case of "missing marks" need to be further investigated by the ASAS Managers. It was attributed to a kind of system error by three instructors. Others attributed it to their own inexperience with the system use, for which they suggested the need for more training.

5.7   Contributions of the Study

Despite a few limitations discussed in Section 5.8, this study makes significant theoretical and practical contributions to the field related to the evaluation of post-implementation success of ISs. From a theoretical point of view, the results of this study show that there are similarities with previous studies which are already discussed and cited in previous sections (eg., Bateh et al., 2013; Chung et al., 2015; Dwivedi et al., 2013; Choi et al., 2013). Further, the study has provided initial insights on a topic previously unexplored in the Botswana context. Therefore, this study is unique and to some extent, it served the purpose of reducing the knowledge gap in

this area. The adapted model used in this study could be useful for future research on the same or related topic by other researchers with appropriate modifications.

Based on the findings of this study, UB could give more attention to measures that the users have not rated high. The first 18 items in the questionnaire provided ideas on what minimum IS quality attributes must be in place in an ASAS post-implementation environment for users to have satisfactory experiences.

Other organisations that wanted to introduce ASAS or similar ISs could sense from the findings of this study the critical areas to allocate their limited resources efficiently for system quality management and thus increase the chances for successful post-implementation performance and experience. This is important because according to the literature many organisations faced high failure rates with their IS implementation projects. The overall findings and insights from this study may guide future research in various related areas as discussed in the next section.

5.8   Limitations and Opportunity for Future Research

This section presents the limitations of the study and provides ideas to guide future research projects in the field of IS. First limitation was the issue of low survey response rate, and the forced use of a convenience sample against the initial plan of a purposive sample as discussed in Section 3.6. However, this was addressed by giving less weightage to the quantitative side than the qualitative component, and using results from both methods mainly for triangulation purpose. Further, the criterion of 'data saturation' was carefully applied in making a study sample for the interviews. Looking at the time limit to complete a research at Master's level, the researcher considered the alternative strategies as adequate.

Despite these constraints, all efforts were taken to ensure the quality and confidentiality of the captured information, and the privacy of information providers as discussed under 'Ethical considerations' in Section 3.13.

The limitations paved way to propose the following future studies.

(i)   To consider evaluating other modules (eg., finance, human resource, etc) in order to have a holistic picture of the ERP System performance as a whole.

(ii)   To include and compare other categories of stakeholders as subjects such as faculty administrator, IT Technicians, senior management staff, and other support staff.

(iii)   To find ways to employ a larger sample to enhance trustworthiness/ generalization, probably by administering hard copies of the questionnaire to supplement the online mode.

(iv)   To take a step further to apply rigorous user satisfaction measurement methods to achieve replicable, and generalizable measures of ASAS success.

(v)   To undertake studies to understand the extent of independent constructs' contribution to the overall prediction of the model.

Therefore, this study could be considered only as a preliminary look at ASAS user perception with a view to further research in this area.

5.9   Conclusions

The primary objective of this study was to investigate users' perceptions of the performance of UB ASAS in its post-implementation phase and determine whether the system was successfully performing or there was any gap between promised and realised benefits. Secondly, the study attempted to find out what factors (both organisational and system-based) impacted the success of the system.

The study used a model adapted from the D&M model information system success model. Three independent but inter-related ASAS quality variables (System Quality, Information Quality and Service Quality) and one dependent variable (User Satisfaction) were included in the adapted model. The study was conducted using a structured questionnaire and semi-structured interviews for data collection within an interpretive case study framework. Results from the two methods were triangulated and integrated to arrive at reliable conclusions.

The main conclusion was that users were satisfied with the performance of the UB ASAS. However, they opined that there was still room for improvement in order to tap the full potential. The study also found that the three quality dimensions influenced the user satisfaction. This meant these three qualities must be maintained to a high level for high level of user satisfaction. Among the three quality dimensions, system quality was the least appreciated quality dimension, followed by service quality, and the information quality. In particular, factors such as unexpected system unavailability, slowness and freezing of the system especially during exam times, lack of adequate training and support, etc require improvement in order to enhance user satisfaction and hence organisational net benefits. Recommendations and suggestion for further research were made based on these findings as discussed in Sections 5.6 and 5.8.

Despite a few limitations as discussed in Section 5.8, this study made significant theoretical and practical contributions to the field related to the evaluation of post-implementation success of ISs. It provided:

(i)   A contextual understanding of distinctive challenges encountered by ASAS users in the UB environment.

(ii)   Practical contributions and recommendations to UB ASAS Managers and other organisations with similar contexts as that of UB in their ERP/ASAS planning and implementation.

(iii)   Initial insights on a topic previously unexplored in the Botswana context. Therefore, this study is unique and to some extent, it served the purpose of reducing the knowledge gap in this area.

References

Abbas, M. (2011). *ERP Systems in HEI Context from a Multiple Perspective View: A Case Study*. Unpublished Doctoral Thesis, University of Manchester, Manchester, UK.

Abdinnour-Helm, S., Lengnick-Hall, M.L., & Lengnick-Hall, C.A. (2003). Pre-implementation attitudes and organizational readiness for implementing an enterprise resource planning system. *European Journal of Operational Research, 146*, 258-73.

Abugabah, A., & Sanzogni, L. (2010). Enterprise Resource Planning (ERP) System in Higher Education: A literature Review and Implications. *International Journal of Human and Social Sciences, 5*(6).

Aggelidis, V. P., & Chatzoglou, P.D. (2012). Hospital information systems: measuring end user computing satisfaction (EUCS). *Journal of Biomed Inform. 45*(3), 566–579.

Agourram, H. (2009). Defining information system success in German. *International Journal of Information Management, 29*(2), 129-137.

Ahmed, Z.U; Zbib, I; Arokiasamy, S; Ramayah, T; & Chiun, L. M. (2006). Resistance to change and ERP implementation success: the moderating role of change management initiatives. *Asian Academy of Management Journal, 11*(2), 1–17.

Ala'a, H., & Heeks, R. (2010). Explaining ERP failure in a developing country: a Jordanian case study. *Journal of Enterprise Information Management, 23*(2), 135–160.

Aldrich, John (1995). Correlations Genuine and Spurious in Pearson and Yule. *Statistical Science, 10*(4), 364–376.

Al-Shamlan, H. M., & Al-Mudimigh, A. S. (2011). The Chang Management Strategies and Processes for Successful ERP Implementation: *A Case Study of MADAR. International Journal of Computer Science*, *8*, 431-435.

Alter, A. (2003). ROI Roundtable. *CIO Insight, 15*(1), 1-20.

Althonayan, M., & Papazafeiropoulou, A. (2013). Evaluating the Performance on ERP Systems in King Saud University (KSU): A Stakeholders' Perspective. *Proceedings of the 46th Hawaii International Conference (HICSS),* 7-10.

Ang, J., & Koh, S. (1997). Exploring the relationships between user information satisfaction and job satisfaction. *International Journal of Information Management*, *17*(3), 169-177.

Bailey, J. E., & Pearson, S. (1983). Development of a Tool for Measuring and Analysing Computer User Satisfaction. *Management Science, 29*(5), 530-545.

Baraka, H.A., Baraka, H.A., & El-Gamily, I.H. (2013). Assessing call centers' success: a validation of the DeLone and McLean model for information system. *Egypt Inform J.,* 14(2), 99–108.

Batada, I., & Rahman, A. (2012). Measuring System Performance & User Satisfaction after Implementation of ERP. *Proceedings of Informing Science & IT Education Conference (InSITE).*

Bateh, J., Castaneda, M.E., & Farah, J.E. (2013). Employee resistance to organizational change. *International Journal of Management and Information Systems, 17*(2), 113-116.

Bossen, C., Jensen, L.G., Udsen, F.W. (2013). Evaluation of a comprehensive EHR based on the DeLone and McLean model for IS success: approach, results, and success factors. *Int J Med Inform.,82*(10), 940–953.

Bowen, G.A. (2008). Naturalistic inquiry and the saturation concept: a research note. *Qualitative Research, 8*(1), 137–152.

Bradley, R. V., Pridmore, J. L., & Byrd, T. A. (2006). Information systems success in the context of different corporate cultural types: *An empirical investigation. Journal of Management Information Systems, 23*(2), 267–294.

Brown, R. B. (2006). *Doing Your Dissertation in Business and Management: The Reality of Research and Writing.* Sage Publications.

Brown, I., & Jayakody, R. (2008). B2C e-commerce success: a test and validation of a revised conceptual model. *Electron J Inf Syst Eval., 11*(3), 167–184.

Bryman, A. (2012). *Social research methods* (4th ed.). Oxford: Oxford University Press.

Calisir, F., & Calisir, F. (2004). The relation of interface usability characteristics, perceived usefulness, and perceived ease of use to end-user satisfaction with enterprise resource planning (ERP) systems. *Computers in Human Behaviour, 20*, 505-515.

Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., & Neville, A.J. (2014). The use of triangulation in qualitative research, *Oncology Nursing Forum, 41*(5). Retrieved November 10, 2016, https://www.ncbi.nlm.nih.gov/pubmed/25158659.

Carlstrom, E.D., & Ekman, I. (2012). Organisational culture and change: Implementing person-centred care. *Journal of Health Organization and Management, 26*(2), 175-191.

Chan, F.K.Y., Thong, J.Y.L., Venkatesh, V., Brown, S.A., Hu, P.J., Tam, K.Y. (2010). Modeling Citizen Satisfaction with mandatory adoption of an e-government technology. *Journal of the Association for Information Systems, 11*(10), 519-549.

Chang, M.K., Cheung, W., Cheng, C.H., & Yeung, J.H.Y. (2008). Understanding ERP System Adoption from the User's Perspective. *International Journal of Production Economics, 113*, 928- 942.

Chen, S. G., & Lin, Y. K., (2008). An Evaluation method for enterprise resource planning systems. *Journal of the Operations Research Society of Japan, 51*(4), 299-309.

Cho, K.W., Bae, S.K., Ryu, J.H., Kim, K.N., An, C.H., & Chae, Y.M. (2015). Performance evaluation of public hospital information systems by the information system success model. *Health Inform Res, 21*(1), 43–48.

Choi, W., Rho, M.J., Park, J., Kim, K.J., Kwon, Y.D., Choi, I.Y. (2013). Information system success model for customer relationship management system in health promotion centers. *Healthc Inform Res. 19*(2), 110–120.

Chung et al. (2015). Symptoms, causes and remedies for failures in enterprise systems implementation. *International Journal of Business Information Systems, 19*(1), 103-118.

Cohen, L., Manion, L., & Morrison, K. (2011). *Research methods in education.* New York, NY: Routledge.

Collis, J., & Hussey, R. (2014). *Business Research: A Practical Guide for Undergraduate and Postgraduate Students* (4th ed.). Palgrave: Macmillan.

Creswell, John W. (2014). *Research Design_ Qualitative, Quantitative, and Mixed Methods Approaches (4th ed.).* London: SAGE Publications, Inc.

Crotty, M. (1998). *The foundations of social research: meaning and perspective in the research process.* St Leonards, NSW: Allen & Unwin.

Davenport, T. H. (1998). Putting the enterprise into the enterprise system. *Harvard Business Review, 76*(4), 121–132.

Davenport, T. H., & Brooks, J. D. (2004). Enterprise systems and the supply chain. *Journal of Enterprise Information Management, 17*(1), 8-19.

Davis, F.D. (1986). *Technology Acceptance Model for Empirically Testing New End-user Information Systems Theory and Results.* Unpublished Doctoral Dissertation, MIT.

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. *MIS Quarterly, 13*(3), 319–340.

Dawson, C. (2002). *Practical Research Methods.* New Delhi: UBS Publishers.

Deetz, S. (1996). Describing Differences in Approaches to Organization Science: Rethinking Burrell and Morgan and their Legacy. *Organization Science, 7*(2), 191–207.

DeLone, W.H., & McLean, E.R. (1992). Information systems success: The quest for the dependent variable. *Information Systems Research, 3*(1), 60-95.

DeLone, W.H., & McLean, E.R. (2003). The DeLone and McLean Model of Information Systems Success: A Ten-Year Update. *Journal of Management Information Systems*, *19*(4), 9–30.

DeLone, W.H., & McLean, E.R. (2004). Measuring e-Commerce Success: Applying the DeLone & McLean Information Systems Success Model. *International Journal of Electronic Commerce*, *9*(1), 31-47.

Denzin, N.K., & Lincoln, Y.S. (2005). Introduction: The discipline and practice of qualitative research. In N.K. Denzin & Y.S. Lincoln (Eds.), *The sage handbook of qualitative research* (2nd ed.). Thousand Oaks, CA: Sage.

Denzin, N. K., & Lincoln, Y. S. (1998). *Collecting and interpreting qualitative materials*. California: Sage.

Dey, P. K., Clegg, B., & Cheffi, W. (2013). Risk management in enterprise resource planning implementation: a new risk assessment framework. *Production Planning & Control, 24,* 1-14.

Dillon, A., & Morris, C. (2001). User Acceptance of Information Technology. In W. Karwowski (Ed.), *Encyclopedia of Human Factors and Ergonomics.* London: Taylor and Francis.

Doll, W. J., Xia, W., & Torkzadeh, G. (1994). A Confirmatory Factor Analysis of the End-User Computing Satisfaction Instrument. *MIS Quarterly,* 453-461.

Dwivedi, Y.K., Ravichandran, K., Williams, M.D., Miller, S., Lal, B., Antony, G.V. and Kartik, M. (2013). IS/IT Project Failures: A Review of the Extant Literature for Deriving a Taxonomy of Failure Factors, In Proceedings of the IFIP WG 8.6 International Working Conference on Transfer and Diffusion of IT, Bangalore, India.

Evans, J. D. (1996). *Straightforward statistics for the behavioural sciences*. Pacific Grove, CA: Brooks/Cole Publishing.

Field, A. P. (2013). *Discovering statistics using IBM SPSS Statistics: and sex and drugs and rock 'n' roll (4th ed.).* London: Sage publications.

Finney, S., & Corbett, M. (2007). ERP implementation a compilation and analysis of critical success factors. *Business Process Management Journal*, *13*(3), 329-347.

Fraenkel, J.R., & Wallen, N.E. (2006). *How to design and evaluate research in education.* New York: McGraw-Hill.

Fusch, P. I., & Ness, L. R. (2015). Are We There Yet? Data Saturation in Qualitative Research. *The Qualitative Report, 20*(9). Retrieved November 10, 2016, from http://www.nova.edu/ssss/QR/QR20/9/fusch1.pdf

Gable, G., Sedera, D., and Chan, T. (2008). Re-conceptualizing Information System Success: the IS-Impact Measurement Model. *Journal of the Association for Information Systems, 9*(7), 377-408.

Ganesh, L., & Mehta, A. (2010).Critical Failure Factors in Enterprise Resource Planning

Implementation at Indian SMEs. Asian Journal of Management Research, 1(1), pp.44-57.

Garaca, Z. (2008): *Business Information Systems*. University of Split, Faculty of Economics, Split.

Gephart, R. (1999). *Paradigms and research methods*. Retrieved November 10, 2008, from http://www.aom.pace.edu/rmd/ 1999_RMD_Forum_Paradigms_and_Research_Methods.html.

Gillham, B. (2000a). Case *Study Research Methods*. London: Bill Gillham.

Gorla, N., Somers, T.M., & Wong, B. (2010). Organizational impact of system quality, information quality, and service quality. *Journal of Strategic Information Systems, 19*, 207–228. Retrieved December 18, 2014, from https://deptmedia.cnam.fr/new/spip.php?pdoc6229

Grix, J. (2004). *The Foundations of Research*. Basingstoke: Palgrave.

Guba, E. G. (1981). Criteria for assessing the trustworthiness of naturalistic inquiries. *Educational Communication and Technology Journal, 29*(2), 75- 91. doi: 10.1007/bf02766777.

Guba, E. G., & Lincoln, Y. S. (1994). Competing paradigms in qualitative research. In N. K. Denzin& Y. S. Lincoln (Eds.), *Hand book of qualitative research* (1 ed., pp.   105-117). Thousand Oaks, CA: Sage.

Hamilton, S. (1980). *Evaluation of information system effectiveness: A comparison of evaluation approaches and evaluation viewpoints.* Graduate School of Business Administration, Univ. of Minnesota, Minneapolis.

Harrison,H., Melanie Birks, M., Franklin, R., & Mills, J (2017). Case Study Research: Foundations and Methodological Orientations. Forum: *Qualitative Social Research, 18*(1), Art. 19. Retrieved August 10, 2017, from http://www.qualitative-research.net/index.php/fqs/article/view/2655/4079

Heale, R., & Forbes, D. (2013). *Understanding triangulation in research.* Retrieved November 10, 2015 from doi: 10.1136/eb-2013-101494.

Healy, M., & Perry, C. (2000). Comprehensive criteria to judge validity and reliability of qualitative research within the realism paradigm. *Qualitative Market Research: An International Journal, 3*(3), 118-126.

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

Hofstede, G. (2001). *Culture's Consequences: Comparing Values, Behaviors, Institutions and Organizations across Nations.* Thousand Oaks, CA: Sage.

Holsapple, C. W., Wang, Y. M., & Wu, J. H. (2005). Empirically testing user characteristics and fitness factors in enterprise resource planning success. *International Journal of Human-Computer Interaction, 19*(3), 323–342.

Hornstein (2008). Using a Change Management Approach to Implement IT Programs. *Ivey Busines Journal.* Retrieved December 20, 2016, from https://iveybusinessjournal.com/publication/using-a-change-management-approach-to-implement-it-programs/

Hsieh, H. F., & Shannon, S.E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 15*(9), 1277-1288.

Ifinedo, P., Rapp, B., Ifinedo, A., & Sundberg, K. (2010). Relationships among ERP post-implementation success constructs; an analysis at the organizational level. *Computers in Human Behavior, 26* (5), 1136-1148.

Iivari, J. (2005). An Empirical Test of the DeLone and McLean Model of Information System Success. *The DATA BASE for Advances in Information System, 26*(2), 8-27.

Ives, B., Olson, M. H., & Baroudi, J. J. (1983). The Measurement of User Information Satisfaction. *Communications of the ACM, 26*(10), 785-793.

Jamieson, S. (2004). Likert scales: how to (ab)use them. *Med Educ., 38*(12), 1217–1218.

Jen WY, Chao CC. (2008). Measuring mobile patient safety information system success: an empirical study. *Int J Med Inform., 77*(10), 689–697.

Jabareen, Y. (2009). *Building a Conceptual Framework: Philosophy, Definitions, and Procedure.* December 19, 2015, Retrieved November 7, 2016, from http://creativecommons.org/licenses/by/2.0

Kendall, L. (2008). The conduct of qualitative interview: Research questions, methodological issues, and researching online. In J. Coiro, M. Knobel, C. Lankshear & D. Leu (Eds.), *Handbook of research on new literacies* (pp. 133-149). New York: Lawrence Erlbaum Associates.

Khare, N. (2014). A Study of Implications of Enterprise Resource Planning (ERP) system in Higher Education. *Sinhgad Institute of Management and Computer Application (SIMCA).*

Kirk, J., & Miller, M. (1986). *Reliability and Validity in Qualitative Research*. London: Sage publications.

Koch, C. (2011). *A status on enterprise resource planning (ERP) studies in information systems research.* In Computer and Information Science (ICIS), IEEE/ACIS 10th International Conference (pp. 409–414).

Kothari, C. R. (2004). *Research Methodology –Methods and Techniques, (2nd ed.).* Delhi: New Age International (P) Ltd.

Kuhn, T. (1962). The Structure of Scientific Revolutions (2nd ed.). *International Encyclopaedia of Unified Science, 2*(2). Chicago: The university of Chicago press.

Kulkarni, U. R., Ravindran, S., & Freeze, R. (2007). A knowledge management success model: Theoretical development and empirical validation. *Journal of Management Information Systems, 23*(3), 309–347.

Kumar, R. (2011). *Research Methodology: A step-by-step guide for beginners* (3rd ed.). London: SAGE Publications.

Kushwaha, K. (2015). *Benefits of ERP in Education Sector (University and Colleges).* Retrieved February 22, 2016 from, https://prezi.com/login/?next=/ya6esu_5egcf/benefits-of-erp-in-education-sectoruniversity-and-colleges/

Kutlu, B., & Alkaya, A. (2015). Measuring the Delone and Mclean Model of Information Systems Success Applied to Banking Sector of Turkey. *International Journal of Advanced Computational Engineering and Networking, Volume-3*(8). ISSN: 2320-2106.

Kyngas, H., & Vanhanen, L. (1999). Content analysis as a research method. *Hoitotiede, 11*, 3-12.

Law, C., Chen, C., & Wu, B. (2010). Managing the full ERP life-cycle: Considerations of maintenance and support requirements and IT governance practice as integral element of the formula for successful ERP adoption. *Computer in industry, 61*, 297-308.

Leedy, P. D., & Ormrod, J. E. (2010) *Practical Research: Planning and Design* (9th ed.).

NYC: Merril.

Leidner, D. E., & Kayworth, T. (2006). A review of culture in information systems research: Toward a theory of information technology culture conflict. *MIS Quarterly, 30*(2), 357-399.

Levi, S., & Doron, T. (2013). Critical success factors in enterprise resource planning systems: Review of the last decade. *Communications of the ACM*, *45*(4).

Light, B. (2005). Going beyond 'misfit' as a reason for ERP package customisation. *Computers in Industry, 56*(6), 606-619.

Mardiana, S., Tjakraatmadja, J. H., & Aprianingsih, A. (2015). DeLone–McLean Information System Success Model Revisited: The Separation of Intention to Use - Use and the Integration of Technology Acceptance Models. *International Journal of Economics and Financial Issues, 5* (Special Issue), 172-182. Retrieved Jan 12, 2016, from http: www.econjournals.com

Markus, M.L., Axline, S., Petrie, D., & Tanis, C. (2000). Learning from adopters' experiences with ERP: Problems encountered and success achieved. *Journal of Information Technology, 15,* 245–265.

Markus, M.L., & Tanis, C. (2000). The Enterprise Systems Experience: From Adoption to Success. In R.W. Zmud, (ed.), *Framing the domains of IT research: Glimpsing the future through the past.* Cincinnati, OH: Pinnaflex Educational Resources, pp.173-207.

Mason, M (2010). Sample Size and Saturation in PhD Studies Using Qualitative Interviews. *Forum: Qualitative Social Research, 11*(3): 1- 8.

Mason, R. O., & Mitroff, I. I. (1973). A program for research on management information systems. *Manage. Sci., 19*(5). 475-487.

Mastin, L. (2008). *The Basics of Philosophy*. Retrieved June 16, 2012, from http://www.philosophybasics.com/movements_pragmatism.html

Mathwick, C., Malhotra, N., & Rigdon, E. (2001). Experiential value: Conceptualization measurement and application in the catalogue and internet shopping environment. *Journal of Retailing, 77*(1), 39-56.

McKerchar, M. (2008). Philosophical paradigms, inquiry strategies and knowledge claims: Applying the principles of research design and conduct to taxation. *EJournal of Tax Research, 6*(1), 5-22.

Merriam, S. B. (2009). Qualitative research: A guide to design and implementation (2nd ed.). San Francisco, CA: Jossey-Bass.

Mingers, J. (2001). Combining IS Research Methods: Towards a Pluralist Methodology. *Information Systems Research, 12*(3), 240 -259.

Mora, M., Gelman, O., Cano, J., Cervantes, F., & Forgionne, G. (2006). *Theory of Systems and Information Systems Research Frameworks.* Retrieved June 19, 2013, from http://isssbrasil.usp.br/isssbrasil/pdfs/2006-282.pdf

Morris, S.A., Marshall, T.E., & Rainer Jr, R.K. (2002). Impact of user satisfaction and trust on virtual team members. *Information Resources Management Journal 15*(2), 22–30.

Myers, M. D. (2009). Quali*tative Research in Business & Management.* London: Sage Publications.

Myers, M. D. (2010). Qualitative Research in Information Systems. MIS Quarterly. Retrieved July 16, 2016 from, www.qual.auckland.ac.nz

Noaman, A.Y., & Ahmed, F. F. (2015). ERP Systems Functionalities in Higher Education. *Procedia Computer Science, 65,* 385 – 395.

Norman G. (2010). Likert scales, levels of measurement and the "laws" of statistics. *Adv Health Sci Educ Theory Pract., 15*(5), 625–632.

Noudoostbeni, A., Yasin, N.M., & Jenatabadi, H.S. (2009). To investigate the Success and Failure Factors of ERP implementation within Malaysian Small and Medium Enterprises. *Information Management and Engineering,* 157 – 160.

Nudzor, H. P. (2009). A critical commentary on combined methods approach to researching educational and social issues. *Issues in Educational Research, 19(2).*

Ojo, A. I. (2017). Validation of the DeLone and McLean Information Systems Success Model. *Health Inform Res., 23*(1), 60–66.

Ojo, A.I., & Popoola, S.O. (2015). Some correlates of electronic health information management system success in Nigerian teaching hospitals. *Biomed Inform Insights, 7*, 1–9.

Oliver, R.L. (1980). A cognitive model of the antecedents and consequences of satisfaction decisions. Journal of Marketing Research, *17*(4), 460–9.

Parr, A., & Shanks, G. (2000). A model of ERP project implementation. J*ournal of Information Technology, 15*(4), 289-303.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: models, dimensions, measures, and interrelationships. *European Journal of Information Systems*, *17*, 236–263.

Petter, S., DeLone, W., & McLean, E. (2008). Measuring information systems success: Models, dimensions, measures, and interrelationships. *European Journal of Information Systems, 17*, 236–263.

Phillips, D. C. (1990). Postpositivistic science: Myths and realities. In E. G. Guba (Ed.), *The paradigm dialog* (pp. 31-45). Newbury Park, CA: Sage.

Phillips, D. C., & Nicholas C. Burbules, N.C. (2000). *Postpositivism and Educational Research.* eBook: Rowman& Littlefield Publishers.

Pishdad, A., & Haider, A. (2013). ERP institutionalization: Exploring the influential factors. *Journal of Enterprise Information Management, 26*, 642 - 660.

Platisa, G., & Balaban, N. (2009). Methodological Approaches to Evaluation of Information System Functionality Performances and Importance of Successfulness Factors Analysis. *Management Information Systems, 4*(2), 11-17.

Reeves, C.A., & Bednar, D.A. (1994). Defining quality: alternatives and implications. *Academy of Management Review 9,* 419–445.

Ritchie, J., & Lewis, J. (2010). *Qualitative Research Practice*. London: Sage.

Rovai, A., Baker, J., & Ponton, M. (2014). *Social science research design and statistics: A practitioner's guide to research methods and IBM SPSS analysis.* Chesapeake, VA: Watertree Press LLC.

Rubik, C. (2014). *Implementing ERP in Higher Education.* Retrieved July 17, 2015, from http://www.curiousrubik.com/cloud-erp/implementing-erp-higher-education/

Saunders, M., Lewis, P., & Thornhill, A. (2012). Research Methods for Business Students (6th ed.). Pearson Education Ltd.

Schwandt, T. A. (2007). *The SAGE dictionary of qualitative inquiry.* London: Sage publications Ltd.

Seddon, P.B. (1997). A re-specification and extension of the Delone and McLean model of IS success. *Information Systems Research 240*, 240–253.

Seddon, P., & Yip, S. K. (1992). An Empirical Evaluation of User Information Satisfaction UIS) Measures for Use with General Ledger Account Software. *Journal of Information Systems, 6*, 75-92.

Sedera, D., Gable, G., & Chan, T. (2004). *Measuring enterprise systems success: The importance of a multiple stakeholder perspective.* In Proceedings of the 12th European conference on information systems (ECIS 04), Turku.

Sedera, D., Gable, G., & Chan, T. (2003). ERP success: Does organisation Size Matter? *7th Pacific Asia Conference on Information Systems*, Adelaide, 1075 -1088.

Selltiz, C., Marie, J., Morton, D., & Cook, S. W. (1959). *Research Methods in Social Relations* (rev. ed.). New York: Holt, Rinehart and Winston, Inc.

Seo, G. (2013). Challenges in Implementing Enterprise Resource Planning (ERP) system in Large Organizations: Similarities and Differences between Corporate and University Environment. Working paper. *Sloan School of Management, Massachusetts Institute of Technology.*

Skok, K., & Legge, M. (2002). Evaluating enterprise resource planning (ERP) systems using an Interpretive Approach. *Knowledge and Process Management, 9*(2), 72–82.

Smit, J., & Dellemijn, M. (2011). The Relationship between Information Systems Management and Organizational Culture. *Communications of the IIMA,* 11, 21-34.

Stake, R. E. (1995). *The art of case study research.* Thousand, Oaks CA: Sage.

Stange, K. C., Crabtree, B. F., & Miller, W. L. (2006). Publishing multimethod research. Annals of Family Medicine, 4, 292-294.

Stewart, T., (2013). Factors affecting the performance of enterprise resource planning systems in the post-implementation stage. *Behaviour and Information Technology.* Retrieved June 19, 2015, from

http://www.tandfonline.com/doi/abs/10.1080/0144929X.2013.799229#.Ui8VSWTXgsk

Sullivan, G.M., & Artino, A.R. (2013). Analyzing and interpreting data from likert-type scales. J. Grad. Med. Educ., 5, 541–542. doi: http://dx.doi.org/10.4300/JGME-5-4-18.

Susarla, *A.,* Barua*, A., &* Whinston*, A. B. (*2003*). Understanding the service component of application service provision: An empirical analysis of satisfaction with ASP services. MIS Quart., 27*(1), 91-123.

Talet, N., & Alwahaishi, S. (2011). The relevance cultural dimensions on the success Adoption and Use of IT. *3rd International Conference on Advanced Management Science.* IPEDR (19), IACSIT Press, Singapore.

TerreBlanche, M., & Durrheim, K. (1999). *Research in Practice*. Cape Town: UCT Press.

Tilahun, B., & Fritz, F. (2015). Modeling antecedents of electronic medical record system implementation success in low-resource setting hospitals. *BMC Med Inform Mak. 15*, 61.

Urbach, N., & Muller, B. (2012). The updated DeLone and McLean model of information systems success. In: Dwivedi YK, Wade MR, Schneberger SL, editors. *Information systems theory: explaining and predicting our digital society*. NY: Springer. pp. 1–18.

Urbach, N., Smolnik, S., & Riempp, G. (2009). The State of Research on Information Systems Success. *Business & Information Systems Engineering, 1*(4), 315-325.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly, 27*, 425-478. Retrieved June 14, 2016, from http://misq.org/

Walsham, G. (1993). Interpretive case studies in IS research: nature and method. *European Journal of Information Systems, 4*, 74-81

Wixom, B. H., & Todd, P.A. (2005). A Theoretical Integration of User Satisfaction and Technology Acceptance. *Information Systems Research, 16,* (1), 85-102.

Wu, J. H., & Wang, Y. M. (2007). Measuring ERP success: the key-users' viewpoint of the ERP to produce a viable IS in the organization. *Computers in Human Behaviour, 23*, 1582–1596.

Xia, L., Yu, W., Lim, R., & Hock, L. (2010). A Methodology for Successful Implementation of ERP in Smaller Companies. *Service Operations and Logistics and Informatics,* 380 – 385.

Yin, R. K. (2009). *Case study research: design and methods (4th ed.).* Los Angeles, California: Sage Publications.

Yin, R. K. (2014). *Case Study Research Design and Methods (5th ed.).* Thousand Oaks, CA: Sage Publications.

Zaied, A. N. H. (2012). An Integrated Success Model for Evaluating Information System in Public Sectors. *Journal of Emerging Trends in Computing and Information Sciences, 3*(6). Retrieved June 9, 2016, from http://www.cisjournal.org

Zhu, Y., Li, Y., Wang W., & Chen, J. (2010). What leads to Post-Implementation success of ERP? An empirical study of the Chinese retail industry. *International Journal of Information Management*, *30*, 265-276.

Zviran, M., Pliskin, N., & Levin, R. (2005). Measuring user satisfaction and perceived usefulness in the ERP context. *Journal of Computer Information Systems, 45*(3), 43-52

Zviran, M., & Erlich, Z. (2003). Measuring IS user satisfaction: review and implications. *Communication of the AIS, 12*, 81-103.

ASAS User Satisfaction Survey

(Available online at: https://goo.gl/forms/eSeEYA68mresYVma2)

Dear ASAS user,

Good day.

This is a User Satisfaction Survey on the Academic and Student Administration System (ASAS) that is used by both Staff and students of UB. The purpose of the survey is to investigate whether you as a user of ASAS are satisfied with the system's performance and with the extent of support you are receiving in effectively using the system, and it is part of my MBA studies at UB. Your identity will be strictly confidential, and you or your responses will not identified by anyone other than me. All responses will be compiled together and analysed as a group. I would appreciate your taking the time to complete the following survey. It should take about ten minutes of your time.

Further, if you are willing to participate in a follow-up semi-structured interview on your extended perspectives on ASAS performance, you may kindly give your contact details below:

Name: ………………………………… Gender: Male/ Female   Role: Staff / student

Faculty (for staff)/ Programme and Year of study (for students): ……………………...

Phone: ………………………….. email: ……………………………………………….

Please note that the interview responses also will be kept strictly confidential.

Directions: *Please indicate your level of 'agreement' or 'disagreement' with each of the following statements against your personal experience with ASAS in UB.*

Place an "X" mark in the appropriate box of your response.

1. Strongly disagree (SD)
2. Disagree (D)
3. Neither agree nor disagree (Neutral)
4. Agree (A)
5. Strongly agree (SA)

	SD	D	Neutral	A	SA

1. System Quality

(i)   ASAS was always available.

(ii)   ASAS was user friendly.

(iii)   I could easily navigate the ASAS interface (It
        was easy to find and use all the links/menu).

(iv)   ASAS was easy to use.

(v)   ASAS was a secure system (The system was
        password protected; unauthorised persons had no
        access to others' information.)

(vi)   ASAS responded to my requests quickly.

2. Information Quality

(i)   The output information of ASAS was easy to
        understand.

(ii)   ASAS output was always accurate.

(iii)   ASAS always provided up-to-date information.

(iv)   ASAS output was always reliable.

(v)   Information content from ASAS met adequately
        all my needs as a student/ an instructor.

(vi)   ASAS output was well presented.

3. Service Quality

(i)   There was adequate training by IT support
        personnel on the use of ASAS.

(ii)   I got prompt response from IT support personnel
        whenever I needed assistance.

(iii)   The ASAS support team comprised
        knowledgeable persons.

(iv)   When I had a problem with ASAS, IT support
        personnel solved it.

(v)   Services from the IT support personnel were
        always dependable. They delivered what they
        promised to deliver.

(vi)   IT support personnel listened to my problems
        patiently and were always courteous to me.

4. User Satisfaction

        Overall I am a satisfied user of ASAS that is
        currently in use at UB.

Thank you very much for your time and suggestions.

Appendix B: Interview responses

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W
1	Subject II	SYQ	SYQ	SYQ	SYQ	SYQ	SYQ	Avera	IFQ	IFQ	IFQ	IFQ	IFQ	IFQ6	Avera	SR	SR	SR	SR	SR	SR	Aver	UST
2	STAFF1	1	2	2	1	3	3	2.00	3	3	4	3	4	4	3.50	2	2	1	3	3	3	2.33	3
3	STAFF2	1	3	4	4	4	4	3.33	4	3	4	3	4	4	3.67	4	4	4	3	4	5	4.00	3
4	STAFF3	2	4	3	2	4	3	3.00	4	4	3	3	3	3	3.33	3	4	3	3	3	4	3.33	4
5	STAFF4	2	4	3	4	4	5	3.67	4	3	4	4	3	4	3.67	3	4	4	4	4	5	4.00	3
6	STAFF5	3	2	3	3	4	2	2.83	3	3	3	3	4	3	3.17	2	4	3	4	4	4	3.50	2
7	STAFF6	2	2	4	2	3	2	2.50	4	3	4	4	4	3	3.67	4	3	4	4	4	5	4.00	3
8	STAFF7	3	4	3	4	3	5	3.67	4	4	3	3	3	4	3.50	3	4	3	4	4	3	3.50	4
9	STAFF8	2	3	2	2	3	4	2.67	3	4	3	4	2	3	3.17	2	5	3	4	4	2	3.33	2
10	STAFF9	2	3	3	4	3	2	2.83	4	3	3	3	4	4	3.50	4	4	3	4	4	2	3.50	4
11	STAFF10	2	1	2	2	3	2	2.00	3	4	4	3	2	3	3.17	2	4	1	4	3	2	2.67	2
12	STAFF11	1	2	2	1	2	2	1.67	3	4	3	4	3	3	3.33	2	5	1	2	2	3	2.50	4
13	STAFF12	1	2	4	2	3	2	2.33	3	4	3	3	4	2	3.17	3	4	2	4	3	2	3.00	3
14	STAFF13	3	1	2	2	3	2	2.17	3	4	4	4	3	3	3.50	3	4	1	2	4	3	2.83	3
15	STAFF14	1	2	2	4	3	2	2.33	3	2	3	3	2	2	2.50	2	5	1	2	3	2	2.50	4
16	STAFF15	2	2	3	3	3	3	2.67	4	3	2	3	4	3	3.17	2	4	1	3	3	3	2.67	4
17	STAFF16	1	2	2	4	3	3	2.50	3	2	3	4	3	2	2.83	2	4	1	2	4	2	2.50	4
18	STAFF17	3	3	2	3	4	3	3.00	3	3	4	3	3	3	3.17	3	5	2	4	4	4	3.67	3
19	STUD1	4	4	5	5	4	5	4.50	5	4	5	5	5	5	4.83	3	4	5	2	3	4	3.50	4
20	STUD2	2	2	2	4	4	3	2.83	4	4	4	4	4	2	3.67	2	5	3	3	4	4	3.50	4
21	STUD3	3	1	4	3	4	4	3.17	4	4	5	5	5	4	4.50	3	3	3	4	3	3	3.17	3
22	STUD4	3	3	2	2	4	3	2.83	4	3	4	4	3	3	3.50	4	4	3	3	4	4	3.67	4
23	STUD5	2	2	4	3	4	4	3.17	3	4	4	4	4	2	3.50	5	3	4	3	2	3.17	5
24	STUD6	3	3	2	2	3	3	2.67	4	4	5	4	4	4	4.17	2	5	3	4	4	3.50	4
25	STUD7	3	2	4	3	4	3	3.17	4	3	4	4	3	4	3.67	4	3	3	4	3	3	3.33	5
26	STUD8	2	2	4	2	3	2	2.50	3	4	4	5	4	3	3.83	3	4	3	3	4	4	3.50	4
27	STUD9	3	3	4	3	4	2	3.17	4	3	4	4	4	2	3.50	3	3	3	3	3	3	3.00	4
28	STUD10	2	2	4	4	3	3	3.00	2	4	5	4	3	4	3.67	3	5	3	3	4	4	3.67	5
29	STUD11	1	2	3	3	4	4	2.83	3	4	4	4	4	4	3.83	2	3	3	4	3	4	3.17	4
30	STUD12	2	3	4	4	4	2	3.17	4	3	4	5	4	3	3.83	4	4	5	5	4	5	4.50	4
31	STUD13	3	2	3	3	3	4	3.00	2	4	4	4	3	2	3.17	2	3	3	4	5	4	3.50	5
32	STUD14	2	3	4	4	4	5	3.67	4	4	5	4	4	4	4.17	3	3	3	3	4	2	3.00	4
33	STUD15	1	2	4	3	3	2	2.50	3	3	4	4	4	4	3.67	3	4	3	4	3	3	3.33	4
34	STUD16	3	3	3	2	4	2	2.83	2	4	4	5	4	2	3.50	4	3	3	4	3	4	3.50	4
35	STUD17	3	2	4	3	4	2	3.00	4	4	4	4	3	4	3.83	2	5	3	3	4	4	3.50	5
36	STUD18	2	3	4	4	4	4	3.50	4	3	4	4	4	2	3.50	3	3	3	4	4	3	3.33	4
37	STUD19	3	2	3	4	4	3	3.17	2	4	4	5	5	3	3.83	3	4	4	4	4	5	4.00	4
38	STUD20	3	3	4	2	3	3	3.00	4	4	5	5	3	2	3.83	4	3	3	4	4	4	3.67	5
39	STUD21	1	2	3	3	4	4	2.83	4	3	4	4	4	4	3.83	2	4	4	3	3	3	3.17	4
40	STUD22	3	2	4	2	3	3	2.83	2	4	4	5	4	2	3.50	3	5	4	4	4	4	4.00	4
41	STUD23	2	2	2	3	4	4	2.83	4	4	4	4	4	3	3.83	3	4	4	3	5	4	3.83	4
42	STUD24	3	3	4	3	3	2	3.00	3	5	4	5	3	4	4.00	4	4	4	4	4	4	4.00	5
43	STUD25	1	3	4	2	3	4	2.83	2	4	4	4	4	2	3.33	3	5	4	3	3	3	3.50	4
44	STUD26	3	2	2	3	4	2	2.67	4	3	4	4	4	3	3.67	3	3	3	4	4	4	3.50	4
45	STUD27	2	2	4	3	3	4	3.00	3	4	4	5	3	2	3.50	4	4	3	4	3	2	3.33	4
46	STUD28	1	3	2	2	4	2	2.33	4	4	4	4	4	3	3.83	2	5	4	4	4	3	3.67	5
47	STUD29	3	3	4	3	4	3	3.33	2	3	4	4	4	4	3.50	3	3	4	4	4	4	3.67	4
48	STUD30	1	2	3	4	4	3	2.83	4	4	4	5	4	4	4.17	4	4	3	4	4	4	3.83	4
49	STUD31	3	3	4	3	3	3	3.17	3	4	4	3	4	2	3.33	3	3	3	4	3	4	3.33	5
50	STUD32	1	3	4	2	4	4	3.00	4	4	4	4	5	3	4.00	3	3	4	4	4	4	3.67	4
51	STUD33	3	2	3	3	3	2	2.67	2	5	5	5	4	2	3.83	4	4	4	4	4	4	4.00	4
52	STUD34	1	3	4	2	4	2	2.67	4	4	4	4	4	4	4.00	3	3	3	4	3	3	3.17	4
53	STUD35	3	2	4	3	3	3	3.00	4	4	4	5	3	4	4.00	3	4	4	4	4	4	3.83	5
54	STUD36	2	3	3	4	3	4	3.17	4	5	4	4	5	4	4.33	4	4	3	4	3	3	3.50	4
55	STUD37	3	2	4	3	4	5	3.50	2	4	5	4	4	4	3.83	4	4	4	3	4	4	3.83	4
56	STUD38	1	3	2	2	4	2	2.33	4	4	4	5	5	5	4.50	3	5	4	4	4	4	4.00	5
57	STUD39	1	2	4	3	4	3	2.83	4	5	4	4	4	5	4.33	4	4	4	4	4	3	3.83	4
58	STUD40	4	4	5	4	5	4	4.33	4	4	5	4	4	4	4.17	4	4	4	4	5	5	4.33	4
59	STUD41	1	2	3	3	3	4	2.67	4	5	4	5	3	4	4.17	4	4	5	4	4	5	4.33	5
60	STUD42	3	2	4	2	4	4	3.17	4	4	5	5	5	5	4.67	4	4	4	4	4	4	4.00	4
61	STUD43	1	3	3	3	3	4	2.83	4	5	4	5	4	5	4.50	4	4	4	4	4	5	4.17	5

SYQ = System Quality
IFQ = Information Quality
SRQ = Service Quality
UST = User satisfaction

Appendix C: Informed Consent Form

Dissertation Title: Performance evaluation of the Academic and Student Administration System (ASAS) in its post-implementation phase from an end-user perspective: A Case Study at the University of Botswana

Researcher: P. Y. Thomas

Phone number(s):   355 5240 / 71680472

Email: thomaspy@ub.ac.bw

You are kindly requested to participate in a research study on the performance evaluation of the ASAS at the University of Botswana. What you should know about this research study:

- You must have thorough understanding of the purpose, risks, and benefits of this study.
- You have the right to refuse or agree to take part now and change your mind later.
- Ask any questions before you make a decision.
- Your participation is important, yet voluntary.

Purpose

The purpose of the study is to investigate whether you as a user of ASAS are satisfied with the system's performance and with the support you are receiving in effectively using the system.

You were selected as a possible participant in this study because you are one of the active users of ASAS in UB and therefore, are likely in a position to make candid comments on its performance.

Before you agree to participate in the survey, please ask any questions on any aspect of this study that is unclear to you. You may take as much time as necessary to think it over.

Procedures and duration

If you decide to participate, you will respond to the questionnaire that follows and subsequently a short interview to enable me do a follow up of your response which may require some clarification or elaboration.

Risks and discomforts

There are no known risks of any sort to the participants in this study. There are no discomforts also except spending about 20 to 30 minutes each in responding to the questionnaire and attending the interview.

Benefits and/or compensation

The outcome of this study is beneficial to the participants because they become part of this important study as it helps to improve the system in future.

Confidentiality

The data from this investigation will be confidential and will be used only for this study. None of these will be used for any commercial purpose.

Voluntary participation

Participation in this study is voluntary. If you decide to participate, you are free to withdraw your consent and to discontinue participation at any time without any penalty. Any refusal to observe and meet appointments agreed upon with the researcher will be considered as implicit withdrawal and therefore will terminate your participation in the investigation without your prior request.

Authorization

You are making a decision whether or not to participate in this study. If you click the "Yes" button below, you are acknowledging that you have read and understood the information provided above, have had all your questions answered, and have decided to participate. If you decide not to click the "Yes" button, you are not participating in this survey and so, the system will not allow you to proceed with the survey.

You may print this consent form to keep.

If you have any questions concerning this study or consent form beyond those answered by the researcher, including questions about the research, your rights as a research participant, or if you feel that you have been treated unfairly and would like to talk to someone other than a member of the research team, please feel free to contact the Office of Research and Development, University of Botswana.

Do you agree with the terms in the consent form and to participate in the survey?: YES/ NO

Appendix D: Interview Questions

Interview Questions

The interview participants were asked to respond to the following overarching, guiding questions that relate to the research questions of the study and their general response to items in the questionnaire served earlier.

The interviewer provides an overview of his purpose, the intended use of the interview data, and the measures he has taken to protect confidentiality and anonymity. Also he focuses on developing rapport and establishing a relaxed, comfortable climate, and gets the informed consent form signed by the interviewee.

1. Describe the ASAS experience from the go-live stage from your perspective.

2. How would you describe the current status of the ASAS?

3. Does the system meet all your requirements as a student/ an instructor?

4. Has the ASAS greatly contributed towards UB's overall benefits as an effective student administration system?

5. What factors have contributed towards any challenges from the go-live to the current state of the ASAS?

6. Overall are you satisfied with the system?

7. Which quality constructs (SYQ, INQ and SVQ) and which factors under each of these constructs are important in contributing towards the success/ failure of the ASAS? Why?

8. In your view, does any contextual/ organisational factor(s) impact the performance of ERP/ASAS, and hence user satisfaction? (eg; the need of compulsory use of ERP/ASAS without any alternate platforms, lack of management support, lack of enough training, lack of timely technical support, any personal factor(s), or any others such as cultural or organisational, etc). If your answer is "Yes", what are those factors?

Appendix E: Interview Responses

- *I really expected that everything would be easier running with the new system and also faster and less manual work.*
- *The expectation I had, was, anyway, that we would be more flexible and that our people could be more customer focused.*
- *I think, all went pretty well, in my opinion.*
- *I think they have encountered some problems during and after the implementation, but I only have nothing to do with it.*
- *I am just positive about the system. In carrying out my work using ASAS I have hardly had any problems with the system.*
- *I hope all activities will be possible by online.*
- *I had to create excel spreadsheet as a Backup to use when ASAS was not available, so I had to exam marks manually on Excel and ASAS.*
- *I believe something must be done for ASAS to be more available than it is now. We are suffering.*
- *Last semester was bad with regard to exam grades; due to many errors HODs had to be on duty even after the end of the semester.*
- *There should be link between blackboard and ASAS so that marks entered in Blackboard gradebook is automatically transported to ASAS.*
- *I want to learn how Blackboard can be connected to ASAS.*
- *ASAS is user friendly.*
- *It minimizes errors because one doesn't have to calculate manually.*
- *The performance of ASAS is good, but problems occur around exam time; when we want to enter marks, it is either down or responds slowly.*
- *The IT department is always available to help.*
- *I agree that it is user friendly. The issue of being slow always happens around exam time; it should be addressed soon unfailingly because it has been happening for a couple of years.*
- *I am not happy because I am not able to access my class CA grades. Some grades go missing after I have updated and saved them. Not all of entries are captured even when the system responded that it has saved.*
- *ASAS is not always available and accessible when I need it.*
- *IT staff take long to respond because they are thin on the ground. On a lucky day they respond promptly.*

- *ASA has many links that are not activated and not used. For example, the announcement link does not work to distribute messages to selected or all students.*
- *I am not totally satisfied with ASAS because most of the time the system is down.*
- *At the end of the semester, there is always chaos on how to compile the CA and the final exams.*
- *The IT Department also seems to be still learning the system, so they do not always provide solutions to problems encountered.*
- *Why is training always done during exam and not before we use the ASAS?*
- *ASAS is slow for requesting funds*
- *overall I like ASAS*
- *Sad, this system delays getting work done*

- *Everyone must be trained on ASAS and all the links programmed to work to get value for money.*

- *I am not very satisfied, it is complex; It delays work every semester*

- *Prior training would have been good unlike now where you learn to use it and produce results through it. It is simply frustrating.*

- *The processes are easy to grasp and even easier to forge, especially entry of final marks. IT is very much aware of that that is why they have a walk in for everyone every semester end.*

- *I have attended many workshops but I am still not competent in using it*

- *Workshops don't cover everything so each time there is an issue we get to learn how to solve it; it is quite frustrating really. Let us hope these are just teething problems.*
- *I only started using ASAS this semester but I think once I get used to it, it may be a good tool.*
- *I am not satisfied, the navigation is not easy to use*
- *The mandatory use of the system is frustrating because it delays student registration*
- *I think with ASAS, students will register faster as compared to the past and it is cost effective.*

Appendix F: Research Permit/ Ethical Clearance from ORD

UNIVERSITY
of
BOTSWANA

Office of the Deputy Vice Chancellor (Academic Affairs)

Office of Research and Development

Corner of Notwane	Pvt Bag 00708	Tel: [267] 355 2900
and Mobuto Road,	Gaborone, Botswana	Fax: [267] 395 7573
Gaborone, Botswana		E-mail: research@mopipi.ub.bw

Ref: X-REF: UB/RES/ETHI/1750

2nd December 2016

University of Botswana
Department of Business Administration
P/Bag 0022
Gaborone, Botswana

RE: **PERMISSION TO CONDUCT RESEARCH**

**Project Title: "Performance evaluation of the Academic Student Administration
System (ASAS) in its post-implementation phase from an end-user
perspective: A Case Study at the University of Botswana".**

Researcher(s): Pelleth Yohannan Thomas (9902645)

Since it is a requirement that everyone undertaking research in Botswana should obtain
a Research Permit from the relevant arm of Government. The Office of Research and
Development at the University of Botswana has been tasked with the responsibility of
overseeing research at UB including facilitating the issuance of Research permits for all
UB Researchers inclusive of students and staff.

I am glad to advise that approval has been granted for the above study to be conducted at
the University of Botswana. Since the study is to be conducted within the confines of UB,
the study has accordingly been exempted from Government Research Permit requirements.
In reaching the above decisions, it was noted that the above study involves minimal risk.
Before proceeding with the study, the researcher is required to ensure the following:

- **The study will only be conducted within the confines of UB following the approved
  proposal version.**
- **No investigations will be conducted outside UB as part of the study before
  permission is sought from UB authorities as necessary.**
- **APPROVAL DATE**   : 2nd December 2016
- **EXPIRATION DATE**   : 1st December 2017
  After this date, this project may only continue upon renewal. For purposes of renewal, a
  progress report should be submitted to ORD one month before the expiration date.
- **MODIFICATIONS**: Prior approval is required before implementing any significant changes
  to the protocol.

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- **TERMINATION OF STUDY:** On termination of this study, a report has to be submitted to ORD.

- **Other:**
    - **The researchers may accordingly proceed with the above study after fulfilling the above requirements.**

If you have any questions about the information in this letter, please contact the IRB Officer Ms. Dimpho Ralefala at Tel: +267 3552432, E-mail: dimpho.ralefala@mopipi.ub.bw. Contact information is also available at our website: www.ub.bw

Sincerely

Dr M. Kasule
Assistant Director Research Ethics Office of Research and Development

Appendix G: Research Permit from the UB Management

Office of the Deputy Vice Chancellor
Academic Affairs

Corner of Notwane	Pvt Bag 0022	Tel: [267] 355 2033
and Mobuto Road,	Gaborone	[267] 390 4243
Gaborone, Botswana	Botswana	E-mail: dvcaa@mopipi.ub.bw

MEMORANDUM

TO: P. Y. Thomas

FROM: Acting Deputy Vice Chancellor - Academic & Student Affairs

DATE: 06 December 2016

SUBJECT: PERMISSION TO COLLECT DATA FROM THE UNIVERSITY OF BOTSWANA - INSTRUCTORS AND STUDENTS

Reference is made to your letter of the 06 December, 2016 regarding the above. I am happy to grant you permission to collect data within the University of Botswana.

Thank you,

Mrs. M. M. Rapelana
Acting Deputy Vice Chancellor - Academic & Student Affairs