The Usage of Student Administrative Management Systems

A Case Study of Australian and Thai Universities

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Abstract

Despite the growing adoption and popularity of Student Administrative Management Systems (SAMS) in universities worldwide, there has been little examination of how SAMS are used in universities. Thus, the aim of this research was to make a contribution to organisations such as universities and higher educational institutions through increasing their understanding of the outcomes of using SAMS. Moreover, the research has the potential to improve the usage of university student administration systems and contribute to the future of SAMS implementation efforts. Hence, this research studied the usage of SAMS in the Australian and Thai universities. Accordingly, two representative universities in Australia and Thailand respectively were chosen on the basis that both institutions have implemented SAMS. The Australian University installed the application in 2002, while the Thai University did so in 2006. And so, a detailed examination of how SAMS in the university context are employed has generated a number of insights into the system usage phenomenon.

The study adopted a qualitative approach in order to explore the rich data provided by participants. Focus groups, interviews and field observations were the principal data collection methods. Specifically, Grounded Theory has been employed to analyse the data by identifying the phenomena and the consequences resulting from the case studies, with the literature survey providing an initial conceptual framework for this research. As well, a comparative case study approach was used to make contributions to theory development (Brislin, 1976) by identifying the effects of the system usage.

In this research, the analysis of data revealed the factors that influence on system usage across specified groups of users. The study also discovered that systems are affected by the organisations in which they are located and system constraints. Furthermore, the research found that the effects on system usage were also influenced by system design and implementation. The major conceptualisation from this research is the notion of poor system quality which implies that the SAMS are misaligned. Another point to consider is that system usage is significant to the task as well as the users, because systems are mandated for specific and important tasks. In the universities, the users created and implemented a variety of workarounds to manage and execute their tasks. These improvisations are adaptations and manual workarounds which are substituted for the constraints and misfits of the system tasks. As a result, the implications of the workarounds were identified, reflecting the context of the university setting. In this research, a

substantive theory was developed to help organisations better understand the usage of SAMS in the university environment. Understanding SAM's usage in higher education environments provides an important step for contributing and supporting future studies of system usage.

Keywords: Student Administrative Management Systems, System Usage, Australia, Thailand, Grounded Theory, Organisation, Poor system quality, Improvisation, University, Workaround

Declaration

I certify that except where due acknowledgement has been made, the work is that of the author alone; the work has not been submitted previously, in whole or in part, to qualify for any other academic award; the content of the thesis is the result of work which has been carried out since the official commencement date of the approved research program; any editorial work, paid or unpaid, carried out by a third party is acknowledged; and, ethics procedures and guidelines have been followed.

Cherngchai Suwannakoot
Date: 30th November 2013

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Table of Contents

List of Figures

List of Tables

Publications Arising from the Thesis

Suwannakoot, C., Sarkar, P., and Dick, M. (2011). Usage of Student And Administrative Management Systems (SAMS): A Case Study of User Perceptions at an Australian University. 17th Americas Conference on Information Systems (AMCIS), Detroit, Michigan August 4th-7th 2011

Suwannakoot, C., Sarkar, P., and Dick, M. (2011). Usage Of SAMS: Study of User Workarounds At An Australian And A Thai University; The Internet Technologies & Society (IADIS 2011) Conference (ITS 2011), Shanghai, China, 8th - 10th December 2011

Suwannakoot, C., Sarkar, P., and Dick, M. (2011). Institutional Usage of SAMS: Study Of User Workarounds At An Australian And A Thai University; International Conference on Information Management and Engineering (ICIME 2011), Phuket, Thailand, December 21st -23rd, 2011

List of Terms and Abbreviations

AMS	Administrative Management System
AU	Australian University
BOB	Best of Breed
BPM	Business Process Management
CAI	Computer Assisted Instruction
CAQDAS	Computer Assisted Qualitative Data Analysis Software
CBIS	Computer Based Information System
CBMIS	Computer-Based Management Information Systems
CGS	Course Guide System
CRM	Customer Relationship Management
EHR	Electronic Health Record system
EMRS	Electronic Medical Record System
EOL	Student Enrolment Online System
ERP	Enterprise Resource Planning
ES	Enterprise System
ESS	Employment Self-Service system
HCI	Human Computer Interaction
HEI	Higher Educational Institution
HIP	Human Information Processing
HR	Human Resources
HREC	Human Research Ethics Committee
ICT	Information Communication Technology
IEAMS	Internet Integrated Administrative Management System
ILS	Integrated Learning Systems

IS	Information System
IT	Information Technology
ITS	Information Technology Service
Legacy System	In computing a **legacy system** is an old method, technology, computer **system**, or application program,"of, relating to, or being a previous or outdated computer **system**." (Wikipedia December 2014)
MAC	Macintosh Apple Computer
MNC	Multi-National Company
NCODE	National Centre of Distance Education
PBC	Perceived Behavioral Control
PC	Personal Computing
PEOU	Perceived Ease of Use
Portal	A gateway site that links to a number of other sites or services
PU	Perceived Usefulness
PLM	Product Lifecycle Management
RPO	Results Processing Online Enrolment Online
RPS	Results Processing System
SAMS	Student Administrative Management System
SAP	Systems Applications and Product
SATS	Student & Academic Time-Tabling System
SGS	Student Graduation System
SRM	Supplier Relationship Management
STS	Student Timetabling System
SGS	Student Graduation System
TAFE	Technical AND Further Education
TAM	Technology Acceptance Model

TPB	Theory of Plan Behaviour
TTF	Task Technology Fit
TRA	Theory of Reason Action
TU	Thai University
US	United States of America

List of Computer Software

IE	Internet Explorer	Microsoft
Blackboard	Learning System	Blackboard Inc.
Callista	Callista Student Management System	Callista
Cognos	Business Intelligence & Performance Management	IBM
Crystal Report	Business Report Application	SAP
Excel	Spreadsheet Application	Microsoft
Firefox	Firefox Web Browser	Mozilla
Hyperion	Enterprise Performance Management	Oracle
Learning Hub	Student Portal to Blackboard at AU	AU
NVivo	Qualitative Data Analysis Application	QSR International
Opera	Opera Web Browser	Opera Software
Oracle	Oracle Enterprise Application	Oracle
PeopleSoft	PeopleSoft Enterprise Application	Oracle
Safari	Macintosh Web Browser	Apple
Tiger	Macintosh Operating System	Apple
WebCT	Course Tools, Learning System	Blackboard Inc.

1 Introduction

Basden (2006, p. 185) describes that "studies over the past 20 years found that failures in Information Systems (IS) remain high, … Much of the high failure rate is due, not to technical failures but to a variety of human factors". Subsequently, the widespread use of information technology (IT) by non-data processing professionals have further increased the potential of its impact (Torkzadeh and Doll, 1999). Moreover, Basden (2006, p. 185) concludes that "Even if a system meets the needs of its users, it might have unexpected, detrimental impact, possibly indirectly on other stakeholders of a long-term nature". Therefore, the effect of using IT and/or IS by individuals and organisations could relate to how such technology is designed and used. For instance, the development and rising use of Computer-Based Management Information Systems (CBMIS) in organisations has led many researchers to investigate the problems that system users encounter (Robey, 1979). As the result, the need to understand how information technology and information systems are used to deliver benefits and/or achievement to users as well as organisations is important.

According to Abugabah and Sanzogni (2010) "In the last few years, higher education institutions have spent more than billions in Enterprise Resource Planning (ERP) systems investment and this has been substantially continued". These enterprise resource planning systems are designed to assist administrative staff, academics, and students. They are known as Student Administrative Management Systems (SAMS). Today, SAMS have been widely implemented in educational institutions and universities worldwide to replace older administrative software systems so that different organisational functions and systems can be integrated (Fisher, 2006). Despite the widespread implementation of ERP systems in universities globally, the evaluation of the task-enhancing features of such systems is still critical to users. Moreover, it has been claimed that as many as 60% to 80% of all ERP systems fail to meet the expected outcomes (Abugabah and Sanzogni, 2010, Mehlinger, 2006) and there is no reason to believe that SAMS style ERP systems are an exception to this. Furthermore, the effects of ERP systems have not been investigated in order to understand the implications of SAMS usage in universities. With respect to ERP adoption and implementation by higher education, it would be helpful for institutions hoping to take

advantage of these developments to know what experience their staff currently have with SAMS, what are their attitudes towards SAMS, and what they perceive to be the major problems in using this technology (Karl and Catherine, 2007). Thus, it is deemed important for higher educational institutions to examine the experience of their staff in using SAMS for their tasks (Karl and Catherine, 2007). This could pave the way for considering alternative methods of using SAMS.

1.1 Research Rationale

In recent years, SAMS has been developed and employed by many universities. However, the literature on ERP system implementations has reported a number of cases of failure in higher educational institutions (Heiskanen, Newman and Similä, 2000). These findings suggest that ERP misfit issues are bad because the business models underlying most ERP packages reflect European or US industry practices (Shehab, Supramaniam and Spedding 2004) and may not be a universal solution for higher educational institutions (Liang and Xue, 2004). Significantly, ERP misfit is the conflict between the functions and the system implementation. Other obstacles that may arise from the system package are that it does not match organisation-specific, public sector-specific, or country-specific requirements which need more attention when adopting ERP systems (Soh, Kien and Tay-Yap, 2000, Wei, Wang and Ju, 2005). The difficulties and high failure rates in implementing ERP systems in universities have been cited in the literature (Rabaa'i, 2010). In the meantime, limited research has explored the practices of ERP in developed and developing countries (Huang and Palvia, 2001). Yet while there has been research in the area of adoption, there has been little research or study in the area of ERP usage in higher education. Therefore, this study takes the opportunity to analyse system usage in higher education institutions so that the future implementation and use of SAMS is better understood with practical recommendations.

Although the high level of implementation and high impact of ERP have been reported, there has been little research on ERP usage in universities, and almost none in Australia (Morley and Von Hellens, 2003), or in Thailand. A study of the impact on using the ERP implementation, but within a different area, could identify potential benefits to the university, and is therefore an important area for further research (Uervirojnangkoorn, 2001, Morley, 2005). The emphasis is to understand the use of new information systems and their effects on

personnel. However, there was no general attempt to assess the educational impact in this study, nor was there any descriptive assessment of the state of play across all Australian (Cochrane, Ellis and Johnston, 1993), and also Thai institutions. Therefore, this study provides a deep understanding of the usage experiences of such information systems. In this research, two representative universities in Australia and Thailand respectively are chosen on the basis that both institutions have implemented SAMS. The Australian University had implemented the SAMS application in 2002, while the Thai University did so in 2006. As the result, the data collection series at the Thai university was used the same set of the questionnaires which conducted in Australia. Therefore, these questions had been sensibly translated into Thai language. Consequently, all of the data responses were transcribed into English version. Thus, this research presents a comparative case study of SAMS usage in the Australian and Thai universities.

For the purpose of maintaining organisational anonymity as stipulated in the University Research Ethics application, the Australian and Thai universities will be referred to as AU and TU respectively in this research.

1.2 Background to the Research

In 2002 and 2006, the Student Administrative Management Systems (SAMS) were implemented in the Australian and Thai universities respectively and have been used since those dates. Both SAMS have served to assist staff and students to do their required tasks. These Information Management Systems (MIS) are connected to the administrative operations in the university including the schools, faculties and the registrar. SAMS also includes staff and student portals that support users for managing their personal information, and other university service applications. These applications provide students with enrolment assistance, student email accounts, results and assessment information and special consideration applications. For instance, the system enables students to enrol into their subjects prior to the commencement of their semesters. It provides rules covering a wide range of regulations and policies such as subject pre-requisites, student's payment status, course coordinator's decisions and correspondence regarding students' intended enrolment in certain subjects

In AU, the SAMS services more than 60,000 students (international and local) and 3,600 staff members (full-time and part-time) in the university. In TU, there are approximately 17,000 students (international and local) and 1,180 staff members that include full-time and part-time staff. Figure 1 shows the interaction between the various user groups and the SAMS.

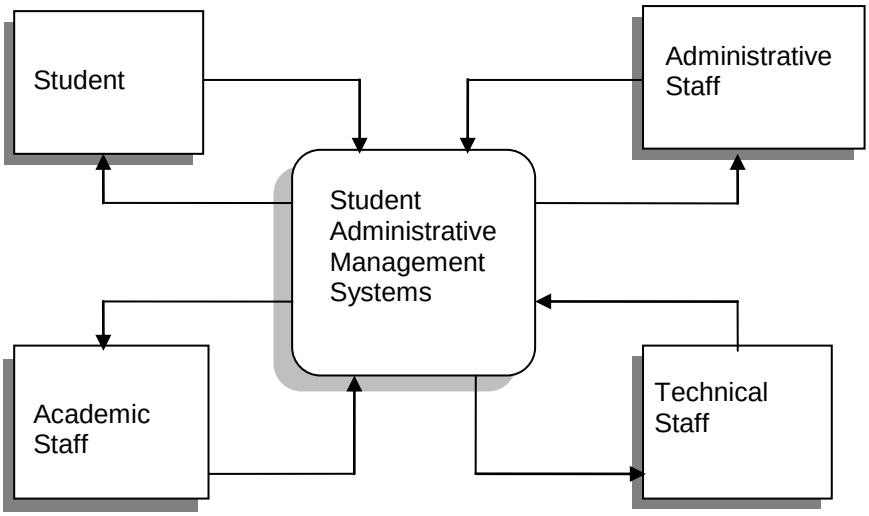

Figure 1 The Context Diagram of SAMS in AU and TU Source: Developed for research purposes

1.3 The Context of SAMS in AU and TU

The Student Administrative Management System (SAMS) is one of the Enterprise Systems (ES) implemented in the Australian and Thai universities. The implementation of SAMS at both universities was part of an Information Systems (IS) improvement and transformation strategy which aimed to provide students, academics, staff and administration with self-service and information management (depicted in Figure 1). The system operated in which data was collected and processed from administrative staff, academics, students, and specifically IT or IS staff that used the SAMS at a university. SAMS is also known as Enterprise Resource Planning (ERP) software which is customised and installed by various vendors. The differences between AU and TU in terms of the core functions of the SAMS are briefly described below.

Australian University (AU)

In the case of AU, SAMS consists of the functions described in the following sub-systems:

- Administrative Management System (AMS) is an Information System (IS) and administrative system that manages students' academic and billing profiles. AMS is the old student administration system which is used for information management of student records, administration and university programs. AMS is also known as 'PeopleSoft', which is the application vendor. Generally, PeopleSoft is considered to be a large enterprise software application having many features and functionalities. Use of the AMS needs to be authorised in order to gain access to the system as it connects to the main university databases. In recent years, the university has tried to avoid mistakes and errors in using AMS by releasing an on-line application version which is available as a read-only system called Internet Integrated Administrative Management System (IEAMS). However, AMS is still available to some users.
- IEAMS is a new front-end to the university's administrative management system (AMS). The system is designed to provide students' details and information for academics and administrative staff. It has a web interface feature and that has made the system easier and more convenient to use. However, IEAMS is using the same database with the AMS as 'read only'. This means that the system is unable to provide the latest update of information until the AMS database has been changed and/or updated.
- Employment Self-Service System (ESS) is the employment management system. ESS provides university staff members with access to view, and in some cases update, their own data in the university's Human Resource/Payroll SAP system.
- Results Processing Online System (RPO) provides academic and administrative staff with the ability to enter students' results onto the PeopleSoft grade roster. The system is also a web-based application for entering current results for Technical and Further Education (TAFE) and other higher education sectors.
- Enrolment Online (EOL) is a student web-based enrolment system that helps students to complete subject and program enrolments. EOL is a PeopleSoft application that runs and works in conjunction with the Student Timetabling System (STS) in order to produce enrolment information for students.

- Course Guide System (CGS) is a web-based application. The system is designed to assist administrative and academic staff enter and edit higher education course guides into the course guide system. The system also allows students to search for details of a particular course and subject.
- Document Tracking System is a web-based application. The system is used for tracking and reporting the progress of enrolment-related documents received at data management services within the university. This system is mainly used for supporting administrative staff.
- Student Timetabling System (STS) is a student information system and it provides information concerning the classroom and date-time for each subject, to each student who has completed enrolment. When students are enrolled via EOL, they are required to wait 48 hours before attempting to create their timetables. The waiting time is required to allow the enrolment information to be processed and transferred to the STS.

For this research, there are some other systems which are not classified as SAMS, because they were not designed for the purpose of information management. In fact, these applications are intentionally used for learning and organising the learning and teaching materials and are best classified as Integrated Learning Systems (ILS). These include, for example, Blackboard, Learning Hub, and WebCT.

Thai University (TU)

TU has implemented SAMS by using Oracle to provide a customised ERP package. The system is a web-based application designed to support students and academic staff in order to manage their information such as: programs and subjects, class rooms, timetables, and results. The system is also known as the "E-Registrar System" which integrates the following functions (modules):

- Administrative Management System (AMS) is the information system that houses and processes all the financial data necessary to meet the management and reporting requirements for the administration and registrar of the university.

- Student Enrolment Online (EOL) is an online enrolment module enabling students to enrol in their subjects prior to the semester's commencement. The system includes university regulations and policies such as subject pre-requisites, student's payment status and the like.
- Student & Academic Time-Tabling (SAT) is a web-based class allocation system for students. This system creates a student and academic timetable. Students are able to indicate their preferred attendance time slots for their units in the semesters they are enrolled in, or place themselves in a class.
- Results Processing System (RPS) provides for the processing of results from the registration of a student and the printing of results and statistical reports.
- Student Graduation System (SGS) is an integrated system within AMS which provides administrative staff with the basis to process certificates and register students who complete the course into the university's graduation database.

1.4 The Scope and Objectives of the Research

The primary objective of this research is to explore and understand system usage of SAMS by its users. This exploratory research will identify how the SAMS are being operated in the two universities. However, this research does not focus on national culture because it is beyond the scope of this research. In fact, the study seeks to understand if there are any differences in terms of system usage between AU and TU and whether there are implications for them. Specifically, the study has attempted to understand these implications that may affect and influence SAMS usage in higher education institutions. Also, there is no pre-existing theory to explain and support the particular (system usage) case studies. Therefore grounded theory was employed to analyse and identify the concepts from the data in order to develop the conceptual framework, as explained in the literature review (see Section 2.9 The preliminary conceptual research framework). The secondary objective of this study is to develop a substantive theory for helping researchers evaluate such information systems in an organisation.

1.5 Research Questions

The research objective is to study the usage of Student Administrative Management Systems (SAMS) in Australian and Thai universities. The study commences by identifying how the SAMS are used by the users and what are the effects upon users in the university environment. The comparison of AU and TU seeks to understand if there are any differences in terms of the systems usage between them. In short, the primary research question is:

- How are SAMS being used by users for doing requisite tasks?

The supplementary research questions are:

- What are the effects of SAMS usage in the universities?
- Are there any differences between AU and TU in relation to the SAMS usage?

1.6 Significance of the Study

It is important to conduct research in the area of IT and IS usage in an organisation, especially in universities because they generally are different to other business organisations (Pollock and Cornford, 2004). As in many educational institutions, the number of system users is vast, and the users differ widely in their areas of responsibility and tasks. This issue needs to be understood as these systems are being increasingly employed within universities. For instance, Heiskanen et al. (2000, cited in Pollock and Cornford, 2004) conducted a detailed study of the implementation of software packages but concluded that such industry standard systems are inappropriate because universities are unique, particularly in terms of their decision-making processes. Furthermore, "many systems development projects are never completed, or if the IS is completed it is not used, or if used for a time it falls into disuse, or when in use it fails to meet all the user's needs" (Basden, 2006). As well, the effect of information technology on work life has been one of the most talked about issues over recent years (Doll and Torkzadeh, 1988, Davis, 1988). According to Burton-Jones and Gallivan (2007), most researchers agree that IT impacts can only be assessed if the systems are used, but they know little about how such impacts occur (Soh and Markus, 1995, Heine, Grover and Malhotra, 2003). Studying the impact of IT on individual performance has become an important factor in determining the value of information systems (Masrek, Karim and Hussein, 2007). Brady also states that "This type of study is important because people are increasingly required to use technology" (Brady, 2003). In this research, the 'impact' is the 'effect' of the SAMS on the users. This issue is expected to increase in importance as

usage rises and investment is allocated more and more to the adoption of information systems within organisations. Therefore, organisations as well as users need to gain a better understanding of the impact on IS usage.

1.7 Contribution to Knowledge

Despite the popularity of ERP in universities, significant failures have been reported. Given the complexity of ERP, even its successful implementation does not always lead to its effective use (Boudreau, 2003). However, whilst it is true that IT tends to study current practices and redesign work flows pertaining to funded initiatives on an on-going basis, IT rarely studies how systems are being used and the unintended uses of the installed technologies (Cramm, 2010). As a result, there is a lack of knowledge to support and describe SAMS usage and its effect on university staff and processes. Therefore, it is necessary to have a knowledge base and guidelines to ensure that higher education institutions can carefully implement and manage the institutional impacts which accompany these proposed changes to large-scale information systems (Fisher, 2006). This research helps to develop that knowledge base.

Although research on the impacts of the information technology has been diverse, it has not focused on work at the level of the individual (Torkzadeh and Doll, 1999). The researcher is interested "in understanding the micro-level shaping of new technological systems and the interactions between these and the wider processes of the university" (Pollock & Cornford 2004 p.12). Moreover, an understanding of SAMS usage in this area is needed so that organisations may have a better understanding of their IS implementations, and develop strategies for future implementation (Morley and Von Hellens, 2003). Thereby, the findings and results can contribute to the knowledge which provides organisational advantage in the future implementation of an ERP system.

Wagner and Newell (2004) argued and suggested that researchers should spend less time studying problems that cause a system to fail, and spend more time studying what is being done, and can be done, to make them workable in practice (Orlikowski and Yates, 2006). In this way, this study focuses on the users who use and interact with the systems because they

are the people who will be affected by how SAMS functions. In addition, the findings from this comparative case study research will be particularly important when considering globalisation issues relevant to the study of information systems.

1.8 Ethical Considerations

Ethics refer to assumptions about the responsibility of a researcher for the consequences of his or her research and its results (Iivari, Hirschheim and Klein, 1998, Arunthari and Hasan, 2005). As case study research employs different methods of data collection, it is likely that a greater range of ethical issues will arise when using a case study design than with other designs (De Vaus, 2001). The research users must also follow good professional ethics in their treatment of the researchers and research results (Zikmund and Babin, 2007). The principal focus of this study is the participants who play the major role in this research project. In particular, the participants have been invited to volunteer to discuss their activities in using the systems. Since the research involves human subjects, it is also based on the requirements that guide privacy protection and other ethical concerns. In order to protect confidentially, the study didn't collect or record any personal information. Indeed, the participants had the right to withdraw from participation at any time and also without the need for acknowledgement. In addition, the researcher had no intention to proceed without carefully considering the entities that would be affected by the conduct of this study. In particular, this research followed and met the ethical agreements of the university's ethics committee in 2009 (Appendix A). This set of guidelines documents the conditions under Human Research Ethics Committee (HREC), reg No. 742 which approve research involving humans and/or their data, as required for any research conducted at the university.

1.9 Organisation of the Thesis

The thesis has the following organisation:

Chapter 1: Introduction

This chapter provides the outlines of the research study: background, purpose and objectives, research questions, and the significance and justification of this topic.

Chapter 2: Literature Review

The chapter describes the context of the research by reviewing the relevant studies of SAMS in the university sector. The researcher reviews the significant findings from published studies and merges them to develop a conceptual framework, research questions, and findings and discussions. The literature also assists in validating the research theory.

Chapter 3: Research Methodology

This chapter describes the research design and methodologies that have been employed in this thesis. The first part discusses the researcher's use of the qualitative approach to find possible outcomes from the case studies, and then used them as the key findings to be validated by a quantitative approach. The second part describes the research design process and data collection techniques (Method). The third part discusses the research justification and triangulation of the study.

Chapter 4: Research Findings

The chapter presents the results (findings) which have been transcribed and coded from the data. The chapter contains the categories, concepts and stories which emerge from the grounded theory analysis.

Chapter 5: Analysis and Discussion

This chapter presents the concepts of grounded theory in the comparative method of case studies between an Australian and Thai University. In the analysis, a number of concepts emerge from the focus groups and interviews, and they are compared and discussed. The researcher describes the concepts and their relationships to the structure of the conceptual framework from the case studies. Lastly, the researcher concludes the results by answering the research questions.

Chapter 6: Conclusions

In this chapter, the study reveals the new theoretical framework which results from the research findings. This chapter also describes the implications and limitations of the research study. Finally, the chapter discusses the key concepts along with the literature to contribute guidelines for future study of IS usage.

Appendices: This section contains the analysis data, research questions, figures, summaries, and tabulations. The ethics (application) approval form is also presented here.

2 Literature Review

This chapter divides the literature into three parts, to provide a conceptual framework for this research. The first part identifies the adoption of Enterprise Resource Planning (ERP) that relates to SAMS in Higher Education Institutions (HEI). This section covers the benefits and limitations of SAMS in a university context. The second part recognises the theoretical foundation of IS usage, and covers the antecedents of IS usage theories and models which help the researcher to understand the concepts of system usage. The third part identifies the condition or situation of system usage in an organisation, and investigates the issues of ERP usage which consequently emerge from system implementation. This also explains cultural issues of the organisation which influence people as well as information systems. In view of SAMS being used in higher education institutions, this chapter reviews previous research, including contrasting perspectives on this particular topic (Library, 2008). However, this review does not attempt to explore or investigate how the systems were implemented, nor the selection of application vendors.

The studies discussed here have provided the basic framework of system usage for conducting this research study. Specifically relevant to this research, the literature has provided an understanding, and outlined the issues pertaining to system usage in organisations. However, the literature does not direct the research so much as provide a check for relevant phenomena. It should also be noted that the development of the literature occurred both before and after the analysis of the data. A number of issues were raised by the analysis that had not been noticed in the initial scanning of the literature, for example the importance of adaptation and workarounds became much higher as a result of the analysis.

2.1 The Adoption of ERP in Higher Education

Generally, an ERP system is a business management system that comprises an integrated set of software which can be used, when successfully implemented, to manage and integrate many of the business functions within an organisation (Zornada and Velkavrh, 2005). For

instance, ERP systems provide seamless integration of processes across functional areas with improved workflow, standardisation of various business practices and access to real-time up-to-date data Shehab, Suprmaniam and Spedding (2004). In short, it enables the integration of transactions-oriented data and business functions throughout an enterprise (Rabaa'i, 2010). Moreover, the increasing deployment of enterprise applications alongside legacy systems has meant that companies are being compelled to adopt Information System (IS) infrastructures that connect applications, data and information (Liang and Xue, 2004).

Although "the major ERP vendors have historically focused on the corporate market, they made the transition into higher education by offering a campus management/student administrative module to complement their suite of solutions" (Nielsen, Beekhuyzen and Goodwin, 2005). Furthermore, as Information Communication Technology (ICT) has become more efficient and robust in the way it uses IS to enhance the management potential of educational institutions. As well the Internet has influenced in a profound way the growth of international education, especially as the cost of access to ICT continues to fall (Smith, 2005).

In recent years, a growing number of Higher Education Institutions (Heiskanen et al., 2000) worldwide have explored the use of ERP as a means of supporting their organisational processes, while linking areas like finance, real estate, and staff management, management of students, and support of teaching and learning (Esteves and Pastor, 2008). In particular, ERP systems for higher education support key administrative and academic services (Zornada and Velkavrh, 2005). Since the 1990s, many universities have turned to ERP systems as a means of replacing existing management and administration computer systems (Pollock & Cornford, 2004). Consequently, many universities and higher education institutions have adopted ERP systems generically known as Student Administrative Management System (SAMS) which integrate portal-based services into their organisational applications. Today, SAMS is increasingly being introduced to Higher Education Institution (HEI) worldwide. In the next section, SAMS is briefly described.

2.1.1 Student Administrative Management System (SAMS)

A Student Administrative Management System (SAMS) is an ERP system which is designed to support staff and students in the administration of educational institutions (Beekhuyzen, Goodwin and Nielsen, 2002, Kvavik, 2002, Esteves and Pastor, 2008). This integrated information management system connects daily operations ranging from admission and registration within the university and other campuses. SAMS is the university's service application that includes Administrative Management System, Student Enrolment Online, Student & Academic Time-Tabling, Results Processing System, Student Graduation System and others, for example Course Guide System, Employment Self-Service System, and etc. (see figure 2 which includes all the relevant systems used by the case study universities). SAMS is used to manage information concerning students, faculties, courses, applications, admissions, payment, exams, and grades (Paulsen, 2002). It is essentially an online system used by staff and students to process enrolment transactions and it enables staff to add or drop students from a course, reserve seats in courses, and make other adjustments pertaining to student enrolment.

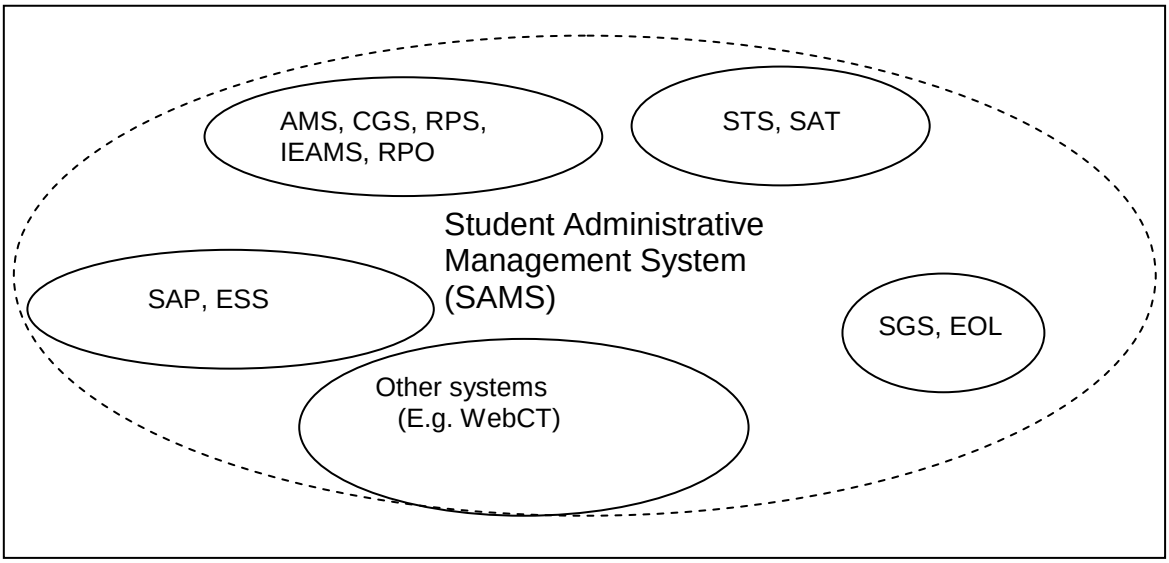

Figure 2 SAMS and other integrated systems, (Developed for the research purposes only)

SAMS is also becoming more popular for delivery of web-based services in higher education (Holland and Sullivan, 2005). SAMS generally provide three areas of services and these are briefly described below.

1. Services for Academic staff

SAMS can be described as a staff portal or organisation portal, whose purpose is to support the access and availability of customised and personalised information for academic users. Generally, the university portal provides a source of system information and resources for staff. The online portal for academic staff members has provided more convenient and up-to-date services for access to courses and materials that are available from the university. Thus, every academic staff member would have their own authenticated personal password to access the SAMS database system. Typically, academics use SAMS for checking and recording student information such as results, grading, subjects or program and time-table. Specifically, SAMS also provides services for academic users, keeping and maintaining their personal information such as employment records, annual leave, and salaries.

2. Services for Administrative staff

SAMS is the administrative system which typically includes functions or features to authorise users to manage information such as students, subjects and programs, and maintain the institution's course planning. The system provides teaching calendars or subject schedules and course prerequisites. Although the administrative staff portal has included details and functions similar to the academic staff portal, it is designed mainly for administrative tasks. For example, the SAMS can be an online financial system used by the registrar's office to process enrolment transactions and calculate tuition fees for students.

3. Services for Students

Services for students are based on using student administration tools as a guideline, so that students can access the database and manage their own personal data. The student web portal is designed to facilitate students in self-managing their activities such as: enrolment, checking grades, viewing assessment results, e-mail, and other aspects of their education. This application provides students with enrolment assistance, student email accounts, results and assessment information and special consideration applications. Prospective students are be able to lodge electronic requests for course information, as well as to make admission

applications (Callista, 2008). Students are able to use most functions that are provided in the SAMS to suit their needs, for example alternative student ID, personal details, course enrolment, etc. The student portal is connected with other educational services such as student e-mail, student timetable, instructor timetable, library system, course and program information, learning management systems such as Blackboard and so on.

2.2 The Adoption of ERP in Australian and Thai Universities

ERP adoption has occurred widely in higher education institutions, as many universities worldwide have adopted ERP systems to replace their legacy service systems (King, 2002). This section describes the adoption of SAMS in Australian and Thai universities.

2.2.1 Australian Universities

Between the mid-1980s and the late 1990s, many colleges and universities began restructuring and re-engineering their operating processes to cut costs and become more efficient while responding to increased competition (Morley and Von Hellens, 2003). Specifically, "ERP uptake in Australian universities is significant because by 2002 more than 85% of Australian universities implemented at least one module of an ERP system" (Beekhuyzen et al., 2002). In 2005, Nielsen (2005) reported that 38% of Australian universities had adopted ERP solutions from a single vendor and 48% had adopted a 'best of breed' approach with a range of modules from a number of vendors, while 14% had not implemented any type of ERP system. Nielsen (2005) refers to Light, Holland, Kelly and Wills (2000) who define the alternative approach, 'best of breed' (BoB), as integrated components of software from multiple standard package vendors, and in some cases custom components that are made available to suit customers' needs. As a result, a mixture of single vendor and best of breed approaches has been widely adopted by Australian universities (Beekhuyzen et al., 2002, Phillips, 2006). These ERP systems have been developed in conjunction with education professionals to allow institutions to devolve a significant number of tasks to academic and administrative staff in faculties and divisions. Nielsen et al. (2005) conclude that "ERP technology has forced universities to re-engineer their business

processes and retain their users (including management, academics, administration staff, and students)" (p. 282). Today, it also describes as a web-based portal for administrative staff, academics and student self-service (Callista, 2008).

The NCODE–FLA survey provided information about the SAM systems used by 21 of Australia's 38 universities (Paulsen, 2002). Moreover, the survey also shows that 'Callista' is widely used in a number of institutions including Deakin University, Edith Cowan University, Monash University, Latrobe University, Northern Territory University and the University of Western Australia (Paulsen, 2002). However, the survey suggests that PeopleSoft is the most widely used commercial system in Australia (Paulsen, 2002). According to Nielsen et al.'s 2005 report, the Australia National University, Central Queensland University, Griffith University, RMIT University, University of Adelaide, University of Queensland, University of Sunshine Coast, University of Sydney and University of Western Australia use PeopleSoft.

2.2.2 Thai Universities

No report or study of ERP implementation in Thai universities has been found in the literature, and therefore it can be assumed that ERP diffusion is only in its very earliest stages (Allison and DeBlois, 2008). For instance, Stuart (2006) attempted to discover why ERP has not been adopted by Thai universities. It was reported that this was caused by a lack of understanding of the potential for ERP implementation by Thai HEIs/universities as well as the government. Specifically, it is evidence that the ERP system still has not been fully marketed into the higher education sector in Thailand by the vendors.

However, rising student expectations and increasing recruiting competition may eventually drive more institutions to invest in gaining strategic value from ERP (Oliver and Romm, 2000, Michigan, 1995). In addition, many major business sectors in Thailand have already been integrated with, and successfully adopted ERPs in recent years. For example, the total number of Thai companies using SAP is around 180 (Hawat and Chookhiatti, 2005). Moreover, the research also reported that these Thai companies use SAP in conjunction with other systems such as Microsoft, IBM Cognos, Hyperion, PeopleSoft, and data warehouse applications. Indeed, ERP systems are being used by locally owned and multi-national companies (MNC) (Arunthari, 2005). A few years later, a major vendor, Oracle, expanded

more support for its products in Thailand (Nation, 2008). Recently, some of the Thai government's major hospitals have integrated and successfully adopted ERPs (Suebsin and Gerdsri, 2010). These achievements have increasingly become part of the Thai government's and public sector's national development plan. These steps will simplify business processing, reduce costs, and leverage technology to provide quality services using the most effective means possible in the higher education sector (Fisher and Walker-Gibbs, 2006).

According to responses to the Thai government's national ICT plan policy for improving the quality of institution management and education in 2000–2010 (Oxford, 2004), many educational institutions have planned to implement SAMS as part of their registration systems (Titthasiri, 2000), and integrate it within their institution portals. In the last few years, many Thai universities have implemented SAMS to support information access for staff members and students. In general, SAMS is implemented as a service system that is managed by the registrar and IT administration departments. Similarly, most Thai institutions use it for their accounting, personnel, and entrance systems (Titthasiri 2000). In short, SAMS is most commonly used in the registration process, student timetables, the checking of grades and curriculum resources.

2.3 Benefits of ERP

Higher education has been strongly influenced by global trends, especially as a result of the call by governments for universities to improve their performance and efficiency (Abugabah and Sanzogni, 2009, Allen and Kern, 2001). To this end, many tertiary institutions have implemented ERP systems (Zornada and Velkavrh, 2005). According to Abugabah and Sanzogni (2010), the aim of ERP implementation is to improve the quality of university information management systems. A study by Kvavik (2002) surveyed 480 higher education institutions throughout the United States and found the following reasons why institutions implemented ERP systems (Stuart, 2006, p.18):

- Replacement of ageing office system;
- Modernisation of the campus environment;
- Provision of better management tools;
- Increase in customer satisfaction;

- Efficiency improvement;
- The solution of year 2000 problems.

According to Swartz and Orgill (2001), cited in Stuart, (2006, p. 18) the benefits that ERP systems can bring to universities can be summarised as follows:

- Improved access to accurate and timely information;
- Enhanced workflow, increased efficiency, and reduced paperwork;
- Tightening of controls and communication alerts;
- User-friendly web interfaces;
- A streaming of processes and ease of adoption of best practices;
- The establishment of new systems and the integration of existing systems.

These benefits reflect the importance of SAMS and its appeal for many higher education institutions. However, despite the growing number of systems implemented in higher education institutions, instances of unsuccessful implementation have occurred (Yuthas and Young, 1998, Zornada and Velkavrh, 2005). Similarly, Kvavik (2002, cited in Stuart, 2006) found that "51% of the respondents judged the implementation to be a success, 46% reported partial achievement, and only 3% agreed that the system was a failure" (p.19). However, the identified benefits will be dependent on the quality of the professionals implementing it (McDonald, Mors and Phillips, 2003). Many ERP systems do not provide close-fitting software for specific business processes, particularly for small or unique ones (McDonald et al., 2003). Integration also appears to be extremely difficult to achieve through enterprise solutions, and the generality of functionality is a serious limitation of many ERP systems (Lee, Siau and Hong, 2003).

2.4 Limitations/ Drawbacks of ERP

Although there have been a number of successful ERP implementations in organisations, only a few reports of success in universities have emerged (Worthen, 2002). The difficulties and high failure rate in implementing ERP systems have been widely cited in the literature (Davenport, 1998), and discovered by other researchers looking at ERP in universities (Beekhuyzen et al., 2002). Phillips (2006) reports that no university would claim to have

perfect administrative systems and few, if any, would claim to have the full range of expertise needed to implement perfect systems. For instance, universities are fundamentally different from business organisations in their decision making (Pollock and Cornford, 2004). Therefore, it is possible that the standard IS development strategies developed for business may not be appropriate in universities (Heiskanen et al., 2000, Pollock and Cornford, 2004). According to von Hellens, Beekhuyzen and Nielsen (2005), the packaged and modular nature of these systems is also problematic, as universities must adjust their business processes to fit the system, or customise the system to fit the organisation's business processes. Swartz and Orgill (2001, p.6) state that "one of the biggest problems in ERP implementations is when the institution attempts to customise the new system to fit every existing business practice". Thus, issues arising in the use of computerised information systems involve not only technological questions, but also questions of organisational structure, or authority and responsibility, and decision-making (Teichroew, 1971). This was shown to be possibly a result of particular structures and decision-making processes which are different to those in the corporate world (von Hellens et al., 2005, Fisher, 2006).

In this issue, the context of 'misfit' is regarding to the IS problems when an organisation adopts ERP software. For instance, "Misfits in data arise from incompatibilities between organisational requirements and the underlying data model, which could be compared to the architecture of the specific software" (Johansson, 2009). Lucas, Wallace and Ginsberg. (1988, cited in Liang and Xue, (2004) define misfit or misalignment as being an historically common software adoption problem. In theory, Soh et al. (2000) have classified three types of misfits as follows:

1. Data misfits arise from incompatibilities between organisational requirements and the ERP package regarding the data format as well as the relationships among entities in the underlying model. For example, the ERP inefficiently manages a high volume of product master files, and is unable to design complicated bills of materials and production planning formulations (Wong, Scarbrough, Chau and Davison, 2005).
2. Functional misfits are described in terms of the processing procedures required. Functional misfits occur in three different dimensions:

- *Access* misfit means that the user does not have access to the functionality they need to perform a task, e.g. no license to access a specific function. Users must pay for an additional license fee.
- *Control* misfit means that the ERP source code is missing validation procedures or checking routines. However, the missing procedures do not affect day-to-day operations but relate directly to the managements' risk tolerance level, e.g. inadequate control functionality.
- *Operation* misfit occurs when normal operational steps are missing or there is an inappropriate level of support. This is often due to the incompatibility of the embedded business model, e.g. an ERP system does not have the function for tracking the outstanding amount, producing reports on overdue items, and allowing payment by cheque and counter collections.

3. Output misfits are the most prevalent form of misfits. By comparison with the business architecture, the reason this misfit occurs is because the ERP does not support the business model in terms of the presentation format and the output's information content. For example, the user does not get the required information regarding the presentation format or the information content, for instance poor reporting from the system.

According to Davis (1988) found in Soh et al. (2000) report that the different types of ERP misfits are "the gaps between the functionality offered by the package and that required by the adopting organisation". With respect to the misfits between ERP functionality and business requirements (Johansson, 2009), the issue is how to find an alternative or solution that can cope with these kinds of misfits where ERP systems cannot deliver.

2.5 Coping with IS Limitations applicable to ERP

A number of major limitations that occur more generally with information systems are applicable to ERP systems, such as the need for improvisation, adaption and workarounds. For example, research by Ignatiadis and Nandhakumar (2009) examined the problem of ERP implementation, where users had employed workarounds to overcome declining operational

efficiency, and consequently had less organisational control. Since those systems where usage is most often mandatory in organisations, they are frequently depicted as non-flexible (Boudreau and Robey, 2005, Elie-Dit-Cosaque and Straub, 2010). In fact, individual users are forced to adapt in different ways, depending on the degree of disruption (Elie-Dit-Cosaque and Straub, 2010). As a result, a combination of various workarounds arose in the process of interactions around this set of misalignments (Soh and Sia, 2004). For example, they may create strategies to cope with and handle these limitations to support their needs. Following that, employees must constantly adapt to new applications, functionalities, and workflows (Safadi and Faraj, 2010).

The adaptation process can occur in the different periods of pre-implementation, implementation, and post-implementation (Ragu-Nathan, Tarafdar, Ragu-Nathan and Tu, 2008). These problem-solving behaviours have been conceptualised as a 'workaround' (Beaudry and Pinsonneault, 2005). Boudreau (2003) explains that 'tweaking' is one kind of workaround that allows users to use the system in a considerably different way to the way it was supposed to function. For instance, users talk about " the need to 'tweak' the system to fix small problems as they arise"; 'to bed the system down'" (Brady, 2003). Ciborra (1999) states that "In a burst of action the contours of the problematic situation, plans for problem-solving and the deployment of resources coalesce". This way, a workaround appears when users do not comply with the intended and prescribed use of the system (Markus, Petrie and Axline, 2000, Ferneley and Sobreperez, 2006). The following section reviews previous research on ERP limitations in order to understand the results or outcomes of system implementation. The methods for overcoming limitations that have been employed and used by individuals are briefly described below.

2.5.1 Improvisation

According to the Concise Oxford English Dictionary (Oxford, 2004), 'improvisation' is defined as creation and performance (music, drama, or verse) spontaneously or without preparation, and the production or making of something from whatever is available. Yet, "improvisation is a well-grounded process that can be employed to deal with situations where rules and methods fail" (Ciborra, 1999). In terms of IT Service and Support, improvisation means working around a problem, finding a temporary fix (RTFM, 2014). For instance,

organisations installing an ERP system often seek to gain better control over their data and operations (Ignatiadis and Nandhakumar, 2009). This need for improvisation is potentially a major influence on system usage.

A major problem with existing ERPs is the 'misfit' between delivered functionality and required functionality, described as a gap between the processes the ERP supports and the processes the organisation works by (Johansson, 2009). This is an event encountered in IS use where information cannot be properly processed through existing IT functionality or process design, thus triggering improvisations (Johansson, 2009). As a result, IS improvisation has emerged as a strategy to cope with the constraints imposed by disruptive events that occur from system implementation and organisational change. McGann and Lyytinen (2010) propose the following classification scheme for the types of improvisations as follows:

1. Configured Process Improvisation: A dynamic modification of an information system user process facilitated by existing system functionality. This promotes agile responses to changing system requirements by rapidly developing new use processes. For example, changing the order entry process by changing a task sequence or user responsibilities.
2. Configured IT Improvisation: A dynamic modification of IT that is facilitated by existing system design functionality. This promotes agile responses by re-configuring the IT system to meet the new requirements. For example, using filtering options to configure what is displayed on reports and showing only a certain part of the information.
3. IT Workaround: An adjustment in the use of an IT system, which involves intentionally using it in ways it was not designed. For example, downloading data into an Excel spreadsheet to perform calculations and analyses that the primary system is unable to do.
4. Process Workaround: The creation of temporary organisational processes in response to an unmet IT requirement by changing the process on an ad-hoc basis. For example, planners mailing schedules to suppliers because they were unable to access them due to the system problem.

In short, the ideal improvisation is to support and minimise the problems or constraints of the system or IT implementation. With intentional and/or unintentional behaviour, users may create their methods or strategies to cope with and handle the limitations that they require to meet their needs. This circumstance arises because many problems emerge only after a technology has been in use for a period of time (Mørch, 1995). When organisations try to rush the introduction process, they often fail to identify and correct the problems that later hamper productive use of the technology (Tyre and Orlikowski, 1994).

2.5.2 Adaptation

The Merriam-Webster (1993) and Concise Oxford (2004) dictionaries define 'adapt' as the ability to make suitable or fit (as for a particular use, purpose, or situation) or, by means of changes or modification, to adjust something to particular conditions or ways. Despite the growth in changing ICT systems in many countries, the fit between ERP and the organisational context is believed to be critical for successful ERP implementation (Rogers, 1995, Tyre and Orlikowski, 1994). The critical challenge here is the mutual adaptation between the IT and user environments (Hong and Kim, 2002). In many cases, organisations initiated their ERP system but could not address the gaps between the changes and practices. These problems, in turn, required taking on technologies already in use (Hong and Kim, 2002, Volkoff, 1999). According to Tyre, M & Orlikowski (1994,p. 99), "the research by Leonard-Barton (1988) shows that undertaking such modification is a complex, recursive process, involving 'mutual adaptation' of both the new technology and the existing organisation, and requiring the active cooperation of both users and technology developers". Bingi, Sharma and Godla (2001) also suggest that if the package cannot be adapted to the organisation, then it has to adapt to the package and change its procedures. Conversely, employees must constantly adapt to new applications, functionalities and workflows (Tyre and Orlikowski, 1994). The adaptation process can occur in either the pre-implementation, implementation and post-implementation phases (Ragu-Nathan et al., 2008).

According to Leonard-Barton (1988) the adaptation is necessary because a technology almost never fits perfectly into the user environment. This complexity takes the form of misalignments (poor fits) between the technology and: (a) technical requirements; (b) the system through which the technology is delivered to the user; or (c) user organisation

performance criteria (Leonard-Barton, 1988). In this way, users adapt themselves to accommodate the misfits of the technology and when a workaround is not readily available, people might change their goals to something that they know the system can accomplish (Leonard-Barton, 1988). Several researchers demonstrate convincingly that it is only through experience with a new technology that a user discovers its ramifications (Koopman and Hoffman, 2005). The user adapts this embodied theory, often changing their practices and situations of use to fit in with the technology in both intended and unintended ways (Tyre and Orlikowski, 1994). User adaptation is the cognitive and behavioural effort exerted by users to manage specific consequences associated with a significant IT event occurring in their workplace (Carroll, 2004). The adaptation process is highly iterative and continually evolves as a function of the ongoing changes that happen in the user/environment relationship (Beaudry and Pinsonneault, 2005). For example, users adapt different techniques to carry out and support their tasks such as attaching post-it notes, detailing how to use, adapting to the language and removing unnecessary details to make the function easier to understand (Randell and Johnson, 2002). Another practical example, a user calls in and tells a system support person that their anti-virus solution is not working. He or she installs a different anti-virus solution (RTFM, 2014).

2.5.3 Workaround

For many years, ERP implementation has been referred to as an ‘organisation wide revolution’ due to the large number of changes it brings to an organisation (Kumar, Maheshwari and Kumar, 2003). However, many organisations faced their difficulties and risks inherent in their ERP systems. ERP adoption is a complex exercise in technological innovation and organisational change management (Bingi, Sharma and Godla, 1999, Hammer and Stanton, 1999, Kumar et al., 2003). For instance, after the systems implementation phrase, “Users perceived the system as inflexible and they deviated from prescribed work processes” (Lalley and Malloch, 2010). According to Martin and Koopman (2004) “These factors include software reliability, system configuration problems, operator training, and the existence of gracefully degrading operating modes”. Moreover, in an insufficient information environment, enterprising individuals who are unable to obtain the data they need from the existing IT system, or from other formal campus processes, compensate by creating or participating in idiosyncratic methods of data collection or

management (Petrides, McClelland and Nodine, 2004). These problem-solving behaviours have been conceptualised as workarounds (Vogelsmeier, Halbesleben and Scott-Cawiezell, 2008). In addition, the results from shortcomings or functional gaps in the existing IS are normally denoted as workarounds (McGann and Lyytinen, 2005).

Workaround is a non-specific term which is grouped with concepts like: 'boundary crossing, substitution, dodges, ingenuities, circumventions, detours, translations, augmentations, improvisations, fixes, kludges, tricks, and minor adjustments (Brady, 2003). "People employ workarounds because they have not been able to obtain what they need from the information systems" (Petrides et al., 2004). Thus, "Some workarounds are necessary because the computer or software as originally designed simply does not address the problem or task at hand" (Koopman and Hoffman, 2005). "Workarounds are traditionally created in response to a problem with a deployed system and are often created in an ad hoc fashion" (Martin and Koopman, 2004). In addition, "the notion of workarounds has long been used in the sociology of technology as a way of conceptualising the strategies employed by users to negotiate and shape artefacts according to their particular needs or existing practices" (Kitto and Higgins, 2010).

Quite often, workarounds appear when users do not comply with the intended and prescribed use of the system after implementation (Petrides et al., 2004). As a result, users seek to circumvent the rigid work processes (Lalley and Malloch, 2010). Any workaround or override behaviour indicates that the technology process is not compatible with the human work process (Safadi and Faraj, 2010). This is despite the fact that in many situations, users develop their workarounds to cope and work out how to bypass these problems or constraints of the system which affect their work or task processes. Conversely, workarounds are also perceived as quick fixes that get tasks done economically, address system glitches and provide opportunities to identify areas for improvement (McCartney, 2006).

For many years, several researchers have identified the approach of workaround in different practices. For instance, Gasser (1986) identifies that a workaround takes in three forms of data adjustment, procedural adjustment, and backup systems. Gasser (1986 pp. 216-217) defines workaround as follows:

1. Data adjustment emerges as users try to force the computer system by entering data that they know is incorrect but would not affect the system processing. Users perceive that it is acceptable in order to obtain accurate results.
2. Procedural adjustment is a method to reverse organisational procedures for obtaining service or making changes. However, this depends on the power to create and exploit flexibility in the user's work (one must know whom to trust, and whom to ask for favours and speedups), which relates to how good are the relationships with the key actors in the working environments.
3. A backup system is used as an alternative backup, manual or automated. Most backup systems employ manual processes which comprise photocopies and duplicate copies. In other cases, backup data is automated since users may use their own backup sources (disk, drive, or computer).

Koopman and Hoffman (2005) report that "workarounds are as creative as true solutions, involving out-of-the-box thinking". Furthermore, they propose four alternative uses of workarounds which depend on the nature of the problem. These workarounds are defined as follows (Koopman & Hoffman, 2005, pp. 71-2):

1. *Completing tasks despite design flaws:* A procedural change in computer system use intended to compensate for a design flaw, typically a software behaviour that is perceived to be a flaw. For example, in order to use web search in Internet Explorer, a user should implement the workaround, as Microsoft (2003) suggested in the Microsoft Security Bulletin (MS02-027).
2. *Completing tasks despite component failures:* A procedural change to using a computer system intended to compensate for a hardware or component failure. For example, the basic workaround strategy in the face of a component failure is to have a backup system (computerised or manual).
3. *Extend functionality:* A new procedure that uses a computer system in a way not originally envisioned to accomplish a task, or software as originally designed does not address the problem or the task at hand. An example would be to use a spreadsheet to compose a report outline.
4. *Intentionally evading designed limits:* A procedural change by users intended to mislead their computers to circumvent the limits or constraints on system operation. This differs from the other types of workarounds in

that the user is trying to do something that the system designers specifically intended the user not to do. For example, holding down the function key to bypass a music CD copy protection scheme.

Drum et al. (2008) theorises that workarounds can yield both positive and negative results. In the positive case, users may work more effectively and compromise with the new system. On the other hand, users may refuse to accept, or resist, the change so as to avoid the stress and anxiety caused by the system. Moreover, the workaround can burden end users if it requires extra work after the actual work has already been done (Poelmans, 1999). However, the evidence of workarounds is found to be more beneficial than undesirable or unwelcome. Petrides et al. (2004) has classified and grouped workarounds into two categories:

1. The essential workaround means that the system itself should be more robust. For example, the functionality and accessibility of data should have been available to the users.
2. The ancillary workaround means that users employ a workaround to support their tasks, and do not actually need the workaround but perceive it to be more comfortable to use it than the normal operation. For example, user created a short-cut to access a function that he or she was normally used.

Petrides et al. (2004) state that "In most cases, employees who had to work around the existing technological and information gaps were very aware of the excessive amount of time and resources they expended to gather and analyse the data they needed to perform their jobs". However, "workarounds need not be 'negative' and they might exist as opportunistic solutions" (Poelmans, 1999). "Many of the individuals who had 'worked around' the existing data system to 'make do' had been able, by and large, to access much of the data they needed to do their jobs effectively" (Petrides et al., 2004). In this way, "the concept of workaround is used to explain how one actor is able to adjust a technology to meet his or her particular needs or goals" (Pollock, 2005).

2.5.4 Manual Workaround

Obviously, the processing of a computer system provides more accurate results than human processing. Computer systems create and bring many benefits into most or every organisation, including strategic business advantages, improved system architectures, outsourced software maintenance, and thus an improvement over the (legacy) manual system (Markus et al., 2000). However, a computer system does not always achieve its objective in maintaining capability and reliability. "The implication is that the computer cannot replace the human who understands life's complexities" (Alvarez, 2008). In this way, there is the practical issue with regard to the problems of solving or dealing with system constraints. According to Strong and Miller (1995, p 208), "in the real world, people understand that computer systems are not always 'correct'; there are exceptions requiring manual intervention". Petrides et al. (2004) explain that "These informal practices can include low-tech solutions, such as hand counting the number of student interventions on a given day each week to establish patterns of use, or reviewing a selected number of student transcripts by hand to determine a program's effectiveness".

Generally, a manual workaround is an alternative method to support users' tasks, in which it can also circumvent any barriers and system issues. This method may provide greater leverage in primary work than changing a system altogether (Petrides et al., 2004), which is rather too difficult to do with a system such as an ERP. For instance, system reliability was a concern for a few organisations; and manual use was essential in those cases to reduce business disruption when the system was down for a significant period of time (Gasser, 1986). The method helped the business get up and running in less than the time required to fix the system problem. Furthermore, a manual workaround can also be used either in conjunction with the system as a parallel procedure, or as an individual process, for example backup. In most cases, many companies as well as their employees have considered and used a variety of approaches including using the manual workaround for dealing with the ERP system's lack of appropriate functionality (Markus et al., 2000, Aladwani, 2001).

2.6 Organisational Culture

"Every organisation has a culture" (Sporn, 1996). In general, organisational culture is defined typically in terms of the way people think, which has a direct influence on the ways in which they behave (Krumbholz and Maiden, 2001). It is generally understood as "the social glue that holds organisational members together" (Smircich, 1983), and expresses the values, social ideas, and beliefs that members share (Laudon, Laudon and Filip, 2004). In addition, organisational culture is this set of fundamental assumptions about what products the organisation should produce, how it should create them, where, and for whom (Beynon-Davies, 2002). Schein (1992) cited in Krumbholz and Maiden, (2001, p. 185) defines organisational culture as:

> *A pattern of shared basic assumptions – invented, discovered or developed by a given group as it learns to cope with its problems of external adaptation and internal integration that has worked well enough to be considered valid and, therefore, to be taught to new members as the correct way to perceive, think and feel in relation to those problems.*

Meanwhile, Trompenaars (1994) found that organisational culture is determined by technologies and markets. For example, it is suggested that the organisational culture of the enterprise in which the ERP system is to be implemented plays an important role (Cox and Spurlock, 2005b, Skok and Döringer, 2001, Soh et al., 2000). Moreover, Romm et al. (1991) cited by Ke and Wai (2008) include that "the fit between the system and organisational culture is critical for the firm to reap potential benefits promised by the system". As a result, organisational culture can influence the development, adoption and use of information systems in various ways (Laudon et al., 2004). Based on the context of the case studies, this research describes organisational culture below.

2.6.1 University Culture

In educational organisations, from a micro-organisational perspective, research has found that organisations (and institutional systems in which they operate) have their own cultures (Hallinger and Leithwood, 1996). These cultures can be inferred from the values, norms,

expectations and traditions that describe human interaction with the system (Hallinger and Leithwood, 1996). This is especially the case in an organisation such as a university, which can have as many subcultures as it has departments or disciplines (Cox and Spurlock, 2005b, Silver, 2003). The mainstays of institutional culture are internal stakeholders: faculty, staff and students, as they are the individuals or entities that have a vested interest in an institution's success (Alfred, 2005). Silver (2003) defines the university as:

> *"A 'collection' of groups, all with their own touchstones of academic and professional behaviour, scholarly values and critical endeavour, which is capable of opening up rifts with its real perceived values and behaviours."*

In fact, the university culture is characterised by the existence of often diametrically opposed academic and managerial sub-cultures, and can be a challenging environment for those involved in managing information (Allen and Wilson, 1996, Allen, 2003, Marcella and Knox, 2004, Oliver, 2004). For example, Silver (2003) notes that "organisational culture that is applied to higher education institutions has no basis in the day-to-day operation of most academic staff in those institutions" (p. 157). Moreover, Pollock & Cornford (2004, p.9) explain that:

> *"For the institution manager or administrator, progress depends on the interaction with a body which it is impossible to understand, and for the student, the duration of their sojourn in the university is typically still a fairly short-lived prelude to something greater.".*

"In this sense 'the university' as an institution tends to lack a clear identity, primarily in the heads of people who constitute it and a myriad of locally negotiated practices and interactions" (Pollock and Cornford, 2004). In addition, 'organisational culture' has been used in higher education to attempt the impossible task of representing its 'collections' as unitary and explicable (Pollock and Cornford, 2004). Hence, Silver (2003) claims that the fact that parts of the 'collection' can be defined as 'subcultures' in some sort of proximity to each other.

According to Sporn (1996, cited in Bartell, 2003, p. 52) "universities are complex organisations with a distinctive set of characteristics". However, an understanding of the

university through its culture can facilitate an analysis of managing its structure and processes (Dill, 1982, Masland, 1985), and would require that strategic planning be guided and supported by an acknowledgement and understanding of the existing culture (Bartell, 2003). Thus a typology of university culture (Figure 3) has been developed which based on the work of Arnold and Capella (1985) by Sporn (1996) to facilitate the assessment of a given university regarding its capacities to adapt and cope with environmental change (Bartell, 2003, Sporn, 1996). Accordingly, the four types of university culture typology are classified as follows (Bartell, 2003, p. 56):

1. Weak and internally oriented cultures (cell 1);
2. Weak and externally oriented cultures (cell 2);
3. Strong and internally oriented cultures (cell 3);
4. Strong and externally oriented cultures (cell 4).

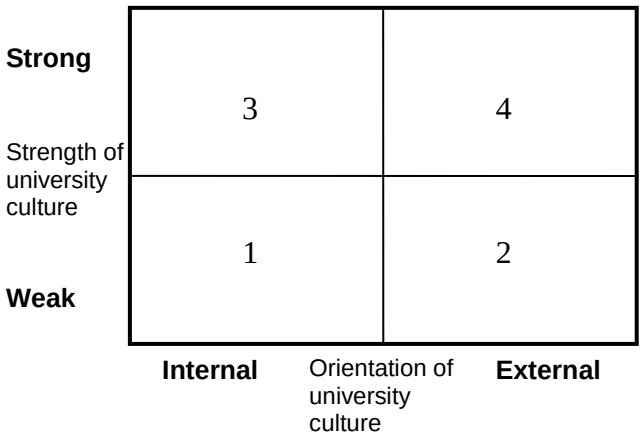

Figure 3 Typology of university culture, a diagram from work of Sporn (1996); Bartell (2003)

In figure 3, each cell of the typology represents a different type of university culture which reflects itself in attempting to respond to the discontinuity between the respective university and its environment in varying ways (Sporn, 1996). Thus, the university cultures can be described as follows (Sporn, 1996, pp. 55-56):

1. Weak, internally-focused cultures have divergent values, beliefs, and attitudes. They are dominated by subcultures with their work being concentrated on internal affairs. University personnel concentrate on their own work and do not identify with the university as a whole. Few members of the university

community are willing to adapt the university to changing conditions in the environment.

2. Weak cultures with an external orientation also have subcultures with divergent values and beliefs, but the subcultures are focused on the external environment. With this orientation, the university can still adapt to changes in the environment. To remain successful, however, a strong university culture will have to be developed if external orientation is to be retained.
3. Strong, internally-focused cultures, where uniform values, beliefs, and attitudes dominate. The university members and groups generally share the same patterns of behaviour and values concerning internal activities. Organisational adaptation to external changes is only poorly supported by the culture. This type of culture is adequate in stable environments such as bureaucratic processes, but it will encounter problems when external changes arise.
4. Strong and externally oriented cultures share the same values, beliefs, and attitudes. Their activities are externally oriented and members focus on the organisation's external development. They show the same patterns of behaviour and they have the ability to react flexibly to changes. This cultural type is the most suitable for enhancing adaptation.

Sporn (1996, p. 55) has also defined the basic assumptions on the culture as follows:

- Strong cultures are more successful in adaptation than weak cultures;
- Externally oriented cultures are more capable of adapting to environmental changes than internally oriented cultures.

Bartell (2003) asserts that "the use of the strength and orientation typology of the university's culture (Sporn 1996) can help to assess the extent of its congruence with the actual functioning structure and the strategies designed to achieve the level of internationalization desired, given the overall surrounding environment" (p. 66). This typology may also be applied beyond the bounds of the university to its external environment. As well, the degree of congruence of the university culture with its external environment could assist in the assessment of the extent of adaptability of the university to innovation, as in the case of internationalisation (Bartell 2003).

2.7 The Theoretical Foundations of IS Usage

Burton-Jones (2005) reports that the high level conceptualisations of system usage have been commonly employed for scholarly studies in four domains as depicted in Figure 4. These are (1) IS for decision making; (2) IS implementation; (3) IS acceptance; and (4) IS success. For instance, in the IS domain of decision-making, Barkin and Dickson (1977) write that the Human Information Processing (HIP) system is the cognitive system having the capacity to organise, manipulate, and integrate data for decision-making. Barkin and Dickson (1977) conclude that an information system is therefore utilised if the output from the information system is organised and/or manipulated and/or integrated by the decision-making process.

In the IS acceptance domain, Davis (1989) and other researchers study system usage as behaviour determined by social and cognitive variables like usefulness, ease of use, and intention to use. These explain most variances in usage and are more likely to be accepted by the user. Within the IS implementation domain, Lucas (1978) explains that the use of a model is a good indicator of implementation success when use is voluntary: for example, a new inquiry system may not have to be used by the decision-maker. If use is voluntary, then a high level of use means that the decision-maker perceives some benefits from the system. However, in cases where usage is required, another measure of implementation success is necessary. Subsequently, DeLone and McLean (1992) studied the IS dependent variables and identified the factors that contributed to an information system's success. They proposed an IS taxonomy as follows: system quality, information quality, usage, user satisfaction, individual impact, and organisational impact. These are all interrelated and interdependent, and they constitute IS success.

By studying the interactions between these components, as well as the components themselves, a clearer picture would emerge as to what constitutes information system success (DeLone and McLean, 1992). Moreover, IS studies have been done on the relationship between attitudes, behaviours (ease of use, usefulness), tasks, information technologies (IT), and outcomes.

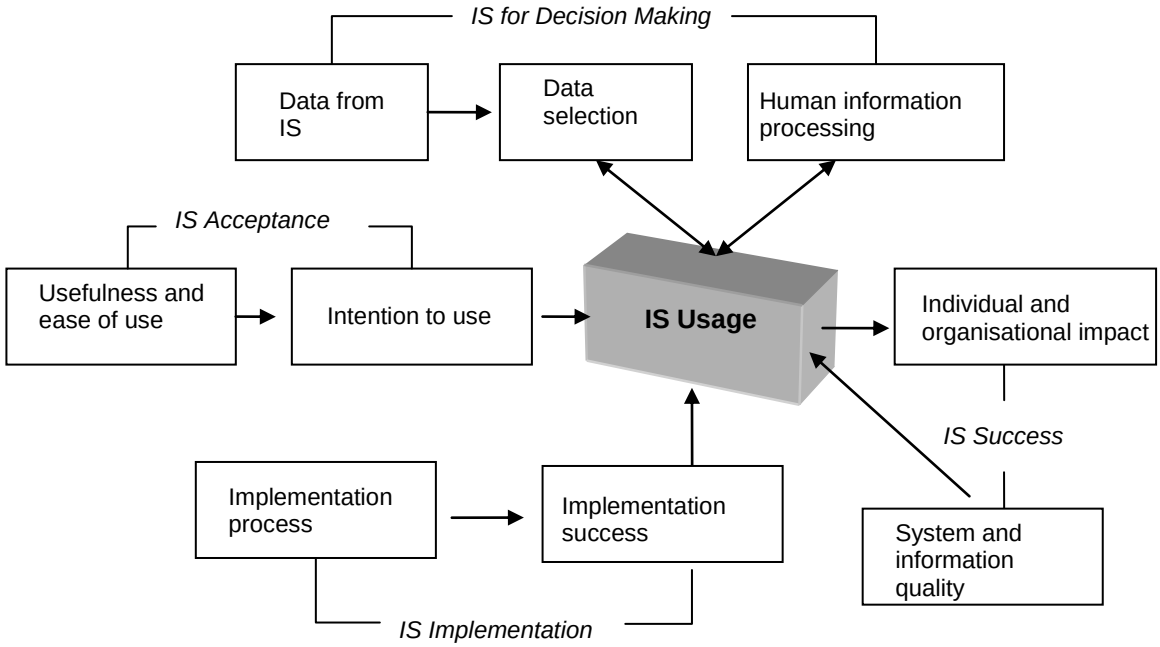

Figure 4 Past conceptualizations of IS usage constructs (Developed for research purposes only)

Adapted from (IS Success) Delone and Mclean (1992) e.g. Goodhue (1995), Lucas and Spitler (1999, Morley, 2005);(IS Decision Making) Barkin and Dickson (1977) e.g. Szajna and Scamell (1993),Yuthas and Young (1998, Strauss and Corbin, 1998); (IS Acceptance) Davis (1989) e.g. Straub et al.(1995), Venkatesh et al. (2003);(IS Implementation) e.g. Lucas (1978) Ginzberg (1981), Barki and Hartwick (1994a)

Consequently, researchers further developed the IS theories to specify and study the range of IS usages which are described as follows.

2.7.1 Theory of Reasoned Action (TRA)

TRA was developed in response to earlier criticisms of attitudinal research which had focused on the lack of a consistent relationship between attitudes and behaviour (Wicker, 1969). The TRA provides a theoretical account of the way in which attitudes, subjective norms and behavioural intentions combine to predict behaviour (Norman and Smith, 1995). TRA was proposed by Fishbein and Ajzen (1975) and it is an especially well-researched intention model of domains (Davis, Bagozzi and Warshaw, 1989). To interpret the TRA, the diagram (Figure 5) shows the processes in the context of belief, attitude, intention, motivation, norm, and behaviour.

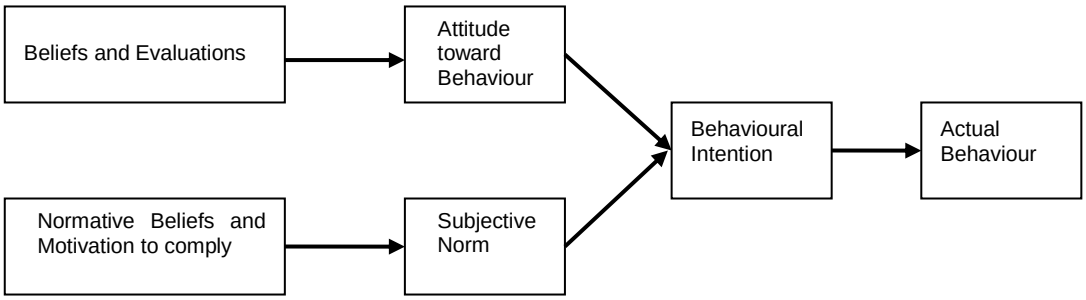

Figure 5 Theory of Reasoned Action (TRA) ***(Davis et al., 1989)***

The TRA model assumed two independent determinants of behavioural intention – attitude toward behaviour and the subjective norm – which are correspondingly related to behavioural and normative beliefs (Gentry and Calantone, 2002). Davis et al. (1989) define TRA as "a person's attitude toward a behaviour that is determined by his or her salient belief about the consequences of performing the behaviour multiplied by the evaluation" (p. 984). According to Davis et al. (1989, p. 984), "Beliefs are defined as the individual's subjective probability that performing the target behaviour will result in a consequence". Furthermore, Ajzen (1991) wrote: "It is a central factor in the theory is the individual's intention to perform a given behaviour" (p.181). The evaluation term refers to 'an implicit evaluative response' to the consequence Davis et al. (1989). For instance, TRA theorises that an individual's subjective norm is determined by a multiplicative function of his or her beliefs, i.e., perceived expectations of specific referent individuals or groups, and his or her motivation to comply with these expectations (Davis et al., 1989, Fishbein and Ajzen, 1975). Therefore, TRA is generally recognized as the best starting point for studying the determinants and effects of individuals' intentions (Gentry and Calantone, 2002, Sheppard, Hartwick and Warshaw, 1988). However, Davis et al. (1989) define that TRA does not specify the beliefs that are operative for a particular behaviour. For example, "when use is mandatory, or a superior or some other individual is requiring the user to use the system; however, the extent of this use may vary" (Barki and Hartwick, 1994a). Thus, in a mandatory environment, user behaviour, intention, and belief become less important. As the result, "the TRA model components can still vary and be used to predict the different level of use" (Barki and Hartwick, 1994a). Consequently, Davis et al. (1989) note that "researchers using TRA must identify the salient beliefs for subjects regarding the behaviour under investigation".

2.7.2 Theory of Planned Behaviour (TPB)

The Theory of Planned Behaviour (TPB) is essentially an extension of the Theory of Reasoned Action (TRA) that includes measures of control belief and perceived behavioural control (Armitage and Conner, 2001) and the prediction of non-volitional control (Norman and Smith, 1995). TPB was initially developed by Ajzen and Fishbein in order to predict behaviour across many settings, and it can be applied to IS use (Mathieson, 1991). The model includes a measure of perceived behavioural control which taps the degree to which the behaviour is seen to be under the person's control (Norman and Smith, 1995). TPB is outlined in Figure 6 below. Mathieson (1991) describes the theory in the following terms:

- Behaviour is determined by intention to perform the behaviour;
- Intention is predicted by the three factors of attitude toward the behaviour, subjective norms, and perceived behavioural control (PBC);
- PBC is the individual's perception of his or her control over performance of the behaviour.

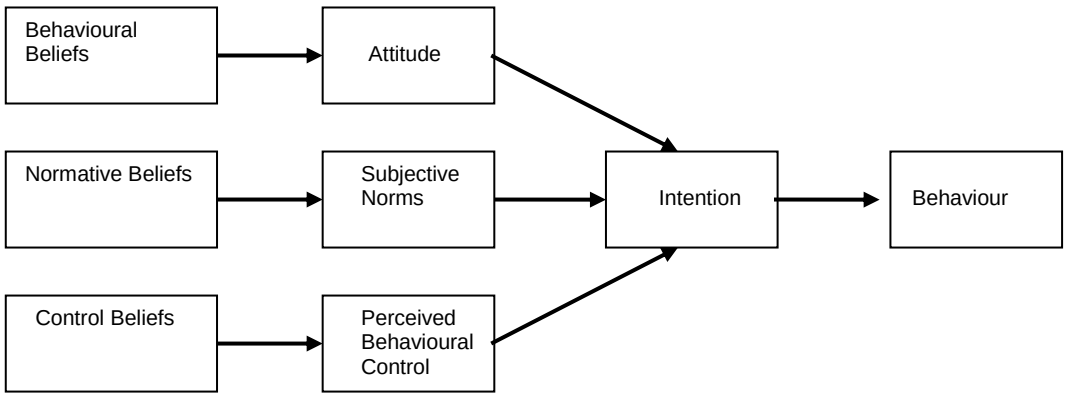

Figure 6 Theory of Planned Behaviour(TPB), ***(Ajzen, 1991), (Mathieson, 1991)***

Mathieson (1991) states that "beliefs are antecedent to attitude, subjective norms, and perceived behavioural control". These salient beliefs are considered to be the prevailing determinants of a person's intentions and actions (Ajzen, 1991). Ajzen (1991) addresses "three kinds of salient beliefs are distinguished: behavioural beliefs which are assumed to influence attitudes toward the behaviour, normative beliefs which constitute the underlying determinants of subjective norms, and control beliefs which provide the basis for perceptions of behavioural control" (p.189). However, TPB is not without criticism (Taylor and Todd,

1995b). For instance, Sparks and Shepherd (1992) cited in Norman and Smith, (1995) argue that perception of control should be related to attitude variability: "As such, the perception of controls may lead to more variable attitudes" (Norman and Smith, 1995). As a result, Norman and Smith (1995) conclude that "future work may also need to address the issue of attitude variability in more detail" (p. 413).

2.7.3 Technology Acceptance Model (TAM)

Davis (1989), cited in van der Heijden, (2003) adapted the theory of reasoned action (TRA) by developing two key beliefs that specifically account for IS usage. While it has been written (Igbaria et al. 1997, p 281) that "TAM replaced TRA's attitudinal determinants, derived separately for each behaviour, with a set of two variables employed in many computer technology acceptance contexts" . Van der Heijden (2003) states that "the first of these beliefs is perceived usefulness (PU), defined as the degree to which a person believes that using a particular system would enhance his or her job performance" (p. 542). Furthermore "the second is the perceived ease of use (PEOU), defined as the degree to which a person believes that using a particular system would be free of effort" (van der Heijden, 2003). TAM focuses on attitudes toward using a particular IT which users develop based on perceived usefulness and the ease of using IT (Dishaw and Strong, 1999). Davis et al. (1989) identified ease of use as an important determinant of system usage through perceived usefulness. However, Adam et al. (1992) concluded that both perceived usefulness and perceived ease of use are important determinants of system usage. Subsequently, Igbaria et al. (1997) decided that both models predicted intentions and usage satisfactorily. Perceived ease of use generates a user's expectation about the effort required to use the technology. Perceived usefulness creates the user's perception that this object will improve the user's performance or productivity. In short, Davis's Technology Acceptance Model explains how users perceive and accept a system that leads to the use of a technology. In this section, Figure 7 depicts the Technology Acceptance Model theory.

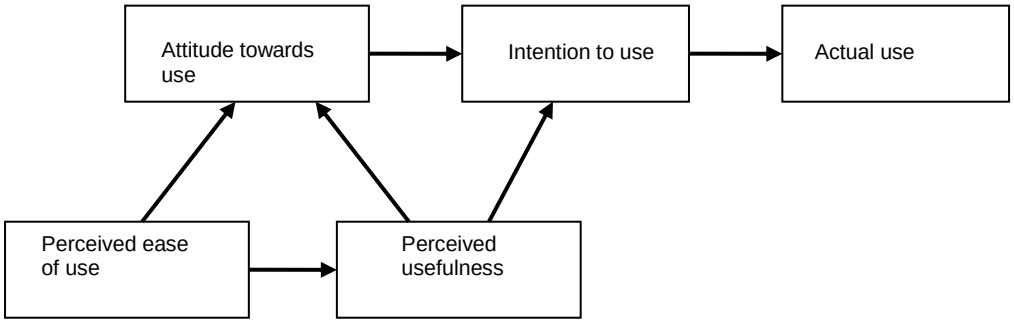

Figure 7 Technology Acceptance Model (TAM) ***(Dishaw and Strong, 1999)***

Despite this long-standing investigation of system usage, studies of its relationship with other constructs often report weak effects (Burton-Jones, 2005). For instance, "the TAM's fundamental constructs do not fully reflect the specific influences of technological and usage-context that may alter the user's acceptance" (Moon and Kim, 2001, Luarn and Lin, 2005). TAM focuses only on perceived usefulness and ease of use and their impact on a user's performance (Abugabah and Sanzogni, 2009). Furthermore, Taylor and Todd (1995a) suggest that "TAM does not include the influence of the social and control factors on behaviour" (p. 562), which are related to behaviour (intention to use). Other writers - Dishaw and Strong (1999) - conclude that "a weakness of TAM for understanding IT utilisation is its lack of task focus; IT is a tool by which users accomplish organisational tasks" (p. 11). Davis (1989), cited in Luarn and Lin, (2005, p. 876) notes that "future technology acceptance research must address how other variables affect usefulness, ease of use and user acceptance, because perceived ease of use and perceived usefulness may not fully explain behaviour intention toward the use of IT". Specifically, TAM lacks task concentration and only focuses on the voluntary utilisation of IS (Abugabah and Sanzogni, 2009). As a result, the constructs of TAM are not suitable for studying IS usage in the context of system mandates.

2.7.4 Task Technology Fit (TTF)

It has been written that "applications of TAM usually focus early in the outcome chain on intention to use or actual use, whereas TTF applications focus later in the outcome chain on actual use or individual performance attributable to actual use" (Dishaw and Strong, 1999). In theory, "task-technology fit is defined as the extent to which technology functionality matches task requirements and individual abilities" (Goodhue, 1995). TTF focuses on the match between user task needs and the available functionality of the IT (Dishaw and Strong,

1999). Goodhue (1995, p. 1828) concludes that "the TTF perspective suggests that a better fit between technology functionalities, task requirements, and individual abilities will lead to better performance (i.e., faster or more effective task accomplishment)". TTF is presumed to lead to higher performance, that is when a technology provides features and support that 'fit' the requirement of a task (Goodhue, 1995). Goodhue and Thompson (1995) propose three components to measure the performance impact of TTF: technology, task, and individual. This has been tested by Goodhue and Thompson (1995) and Dishaw and Strong (1999). Goodhue and Thompson (1995) describe these components in the following terms (see Figure 8):

- Technologies (Characteristic) are viewed as tools used by individuals in carrying out their tasks. Technology characteristics (hardware, software, and data) and user support services (training, helpdesk, etc.);
- Tasks (Characteristic or Requirement) are broadly defined as the actions carried out by individuals in turning inputs into outputs. Characteristics of task (routine, non-routine, interdependence);
- Individuals (Characteristic) may use technologies to assist them in the performance of their tasks. Characteristics of individual (training, computer experience, motivation).

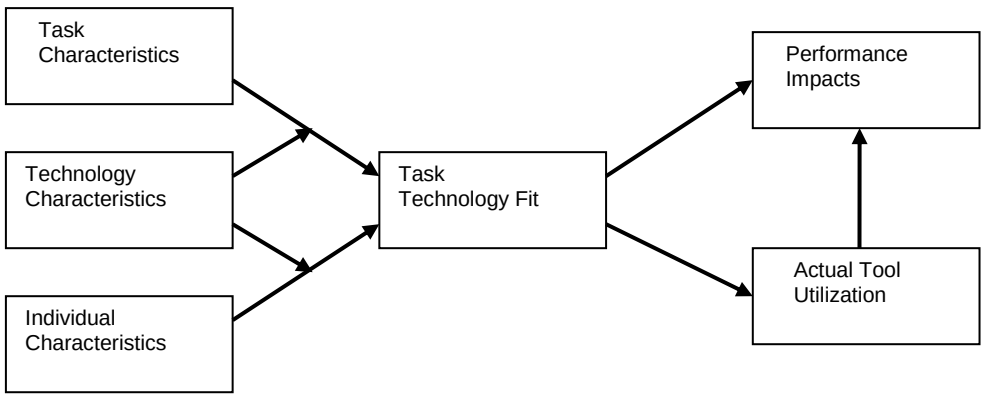

Figure 8 Task-Technology Fit (TTF) ***(Goodhue and Thompson, 1995)***

The TTF goes beyond the Delone and McLean (1992) model by highlighting how technology determines performance impact and explicitly explains a number of missing issues relating to the impact of IT on performance (Goodhue and Thompson, 1995). "While the TTF model explicitly includes task characteristics, which is a weakness of TAM, the TTF does not

explicitly comprise attitude toward IT, which essentially is the core of TAM" (Dishaw and Strong, 1999). Dishaw and Strong (1999) indicate that TAM and TTF overlap in a significant way and they could provide a coherent model if it is integrated. As a result, future research may consider a combination of the two models, as Dishaw and Strong (1999, p. 12) propose "by adding the strengths of TTF models to TAM to produce an integrated model incorporating both attitudes toward IT and the fit between IT functionality and the characteristics of the tasks that IT users are accomplishing with IT".

2.7.5 IS Success

Delone and McLean (1992), cited in Rai et al., (2002) "synthesised a six factor taxonomy of IS success from the diversity of IS success measures contained in the studies, being System Quality, Information Quality, IS Use, User Satisfaction, Individual Impact, and Organisational Impact". The Delone-McLean (2003) model for IS success depicted in Figure 9, assumes that "system quality and information quality, individually and jointly, affect user satisfaction and use" (Iivari, 2005). However, the Delone-McLean 2003 model also combines 'individual' and 'organisation' into a single variable called 'net benefit'. As Delone and McLean state that "because the original term "impacts" may be positive or negative, thus leading to a possible confusion as to whether the results are good or bad (Delone and McLean 2003, p 22). According to Delone and McLean (2003) 'Use' must precede 'user satisfaction' in a process sense, but positive experience with 'use' will lead to greater 'user satisfaction' in a causal sense. Similarly, more 'user satisfaction' will lead to increased 'intention to use', and thus 'use' (Delone and McLean, 2003).

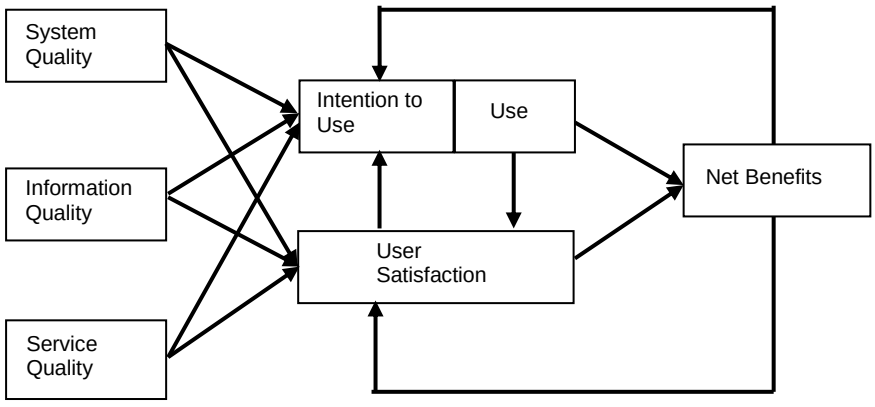

Figure 9 IS Success Model ***(Delone and McLean 2003)***

They also emphasised that these factors did not operate independently but interacted in such a way to influence success (Armstrong et al. 2005) . This indicates that causality flows in the same direction as the information process flows (DeLone and McLean, 2002).

Over many years, the development of IS success models has contributed to many system implementation research studies. However, several issues in IS success models remain (Gable, Sedera and Chan, 2010). The criticism of Seddon (1997) cited by Iivari, (2005) shows that some of the assumed causal relationships in the Delone–McLean model are incomplete. Many researchers criticise the model as being inappropriate when use of a system is mandated in which little information is actually conveyed about the system's success. For instance, according to Rai et al. (2002), "IS success models should include settings that range from strictly voluntary to strictly involuntary use and recommend refinements as appropriate" (p. 66). Moreover, it is evident that actual use, as a measure of IS success, only makes sense for voluntary or discretionary users (DeLone and McLean, 1992). Delone and McLean (1992, p. 88) admit that: this "success model clearly needs further development and validation before it could serve as a basis for the selection of appropriate IS measures". Such 'customisation' of usage models may be important with the increasing scope and role of computer and internet systems in our lives (Lin and Bhattacherjee, 2007).

Referring to the above reviews of the antecedent (IS usage) theories, this research study agrees with Boudreau's (2003) argument that the usage models (TAM, TRA, TPB) in previous IS usage studies are not suitable for studying complex systems such as an ERP system. Certainly, in the case of system usage, there is a great diversity in conceptualisations and yet little-to-no justification that these conceptualisations actually reflect the intended aspects of system usage in reality (Burton-Jones, 2005). These models are more relevant to less complex systems such as general software applications and/or hardware, which can only be used in a limited number of ways (Boudreau, 2003). For example these could include studying internet banking (Shih and Fang, 2004), internet bookshop agency (Gentry and Calantone, 2002), word processing (Davis et al., 1989), voice-mail (Straub et al., 1995), personal computing (Guan, Lee, Cuddihy and Ramey, 2006). Moreover, Benbasat et al. (1987) and Barki and Hartwick (1994b) cited by Elie-Dit-Cosaque and Straub (2010) specifically argue that "PU and PEOU are themselves black boxes that are not easily opened nor easily applied to all technologies. Meanwhile, the TTF and IS success theory seems to be appropriate for conducting the IS usage study. However, both of these theories are not

suitable because the main objective here is to explore what is happening behind the system usage. Thus, there may also be consequences that could lead to, or affect, the use of the IS. Additionally, the predetermined attributes (concepts) such as system quality, information quality, task requirement and individual performance, may not be the only factors that can identify what causes IS usage. In short, these models (theories) are limited for conducting this research study.

2.8 Mandatory System Usage vs. Voluntary System Usage

As a result of the IS usage theory discussions, this section describes system usage in a mandatory and a voluntary situation. Generally, IS can be implemented in an organisation as a compulsory system, a supportive system or both (Rawstorne, Jayasuriya and Caputi, 1998). Thus, a supportive system may be referred to as an alternative system because the user may choose to use it if he or she desires. It is therefore considered to be a voluntary system. On the other hand, a compulsory system would be defined as a mandatory system because employees (users) must use that system for doing their assigned tasks. For instance, "mandatory adoption occurs when the end user is forced by the organisation through reward or punishment or both, to utilise the IS in a way that replaces at least one previous work practice" (Rawstorne et al., 1998). Thus, mandatory system usage exists when employees or users perceive the system to be an organisational requirement (Agarwal and Prasad, 1997, Barki and Hartwick, 1994a, Venkatesh and Davis, 2000, Ward, Brown and Massey, 2005). Brown et al. (2002) cited in Rawstorne (2005), state that there are two factors helping to assess levels of mandate. They are the: (i) 'Degree to which a technology is necessary to perform one's job'; and (ii) 'Degree of interdependence between employees' job functions'.

In a mandatory situation, users are expected to use the system in order to perform the tasks that are assigned by the organisation. "Users may intend to use the mandatory system regardless of their attitude towards the system, simply because they lack the option to not use the system if they want to retain their current position" (Ward et al., 2005). "The mandatory IS and mandatory use environments translate into the obliged use of the system, as decided by management which accounts for the system's users" (Linders, 2006). In contrast, voluntary use usually exists by virtue of the user's attitude of usefulness or quality.

According to Linders (2006) “Voluntary adoption means that a user of the system has the freedom to decide whether or not he or she utilises the IS”. Barki and Hartwick (1994a) include that “voluntary use reflects the individual’s own perceptions and feelings concerning the system”. However in a voluntary situation, users may ignore the system if they feel discomfort or dislike in using it. In this way, the researcher proposes that voluntary system usage is more suitable to the study, i.e. measuring usefulness and the ease of using the technology, if the user has the freedom to use the system. Mandatory usage on the other hand is suitable for particular IS studies where the user is obliged to use the system as decided or determined by the organisation.

2.9 The Conceptual Preliminary Framework

While many researchers carefully use theory to choose antecedents to usage, Burton-Jones and Straub (2006) have indicated that they found no studies that expressed a strong theoretical basis for system usage, its appropriate empirical indicators, or its relationships with other constructs. “The IS field has no generally accepted definition of system usage” Burton-Jones (2005, p231). There has been a dearth of studies on conceptualisation and an in-depth theoretical discussion of usage (Sedera and Tan, 2007). Therefore, Burton-Jones and Straub (2006) include what principles can be used to evaluate system usage in an appropriate way for a given theoretical context? Burton-Jones and Straub (2006) further espouse that lack of theoretical grounding has led to a misconception which is resulting in mixed results.

Subsequently, Burton-Jones and Straub (2006) propose a framework for building multilevel theories of system usage, introduce principles to help researchers use this framework, and provide a concrete illustration of how a multilevel theory of system usage can be developed. As Figure 10 shows, “rich measures incorporate the nature of the usage activity” that measure either system and user or system and task (Burton-Jones and Straub, 2006). Although, Agarwal and Karahanna (2000, p. 665) describe a multidimensional construct labeled ‘cognitive absorption’ and defined as a state of deep involvement with software; in order to measure the richness of system usage, Agarwal and Karahanna propose that the individual traits of playfulness and personal innovativeness are important determinants of cognitive absorption (Agarwal and Karahanna, 2000). However, Burton-Jones and Straub

(2006) belief that omnibus conceptualizations of usage, such as cognitive absorption, are not very useful. Also, "cognitive absorption may or may not be relevant in a given study" (Burton-Jones 2005, p.23). On the other study, Igbaria et al., (1997) measured the degree to which a system is employed in a task. For instance, the number of system features used and the number of subtasks that are used (Burton-Jones 2005). However, Jasperson et al. (2005) cited by Burton-Jones (2005) found the theoretical link between system use and task performance is feeble. Thus, Burton-Jones and Straub (2006) assess performance as an outcome because the individual user has complete control of his or her own work (output) and does not depend on other people. Burton-Jones and Straub believed that the focus on reconceptualisation of the system usage construct should generate more informed research into the pathways by which IT impacts on individuals at work. Burton-Jones (2005, p.21) suggests that "individual system usage comprises the elements in the definition (user, system, and task)" that explain in detail in the section 2.10. As a result, the construct of system, user and task helps to clarify what system usage means and the range and dimensionality of past usage measures. In sum, a significant body of theory has been developed regarding both the analysis of users' tasks and IS (Burton-Jones, 2005). Hence, "it is difficult methodologically to do so because the richness of the activities being measured makes it difficult to construct, and cognitively difficult to respond to, such a measure in practice" (Burton-Jones, 2005, p. 40). In other instances, Burton Jones (2005) suggests that a researcher may employ a very rich measure to capture all of the three elements of usage (system, user, and task). Moreover, the approach would certainly need to be tailored to cater for the practical realities of organisations and still needs to determine what methods to use for obtaining the metrics (Burton-Jones, 2005). Significantly, this measure model still did not describe or identify how a user would employ the IS system in a given task. It merely measured the extent and degree to which the study employed a quantitative approach, and was limited to investigating what are the conflict outcomes, for example organisational versus individual goals (Neuman and Kreuger, 2003).

In order to answer the research question, the empirical study is conducted to explore how the IS is employed by the users. For that reason, the researcher could understand what the user is currently doing (Dragunov, Dietterich, Johnsrude, McLaughlin, Li and Herlocker, 2005). In this way, the researcher will be able to comprehend the system usage. As a result, the research has extended the domain of content measured (Very Rich) from Burton-Jones (2005) to study how users employ the system to do their jobs in the context of system, user,

usage, and task. As shown in Figure 10, the extension of the framework is highlighted in yellow. Much of the emphasis of the research study will focus on the richness of data that emerges from the qualitative study of system, user, and task. Consequently, the research defines qualitative approach as 'Very, Very Rich' by first conducting focus groups and interviews as step 1. Thereafter, the research employs the observation approach as step 2 where the findings that have been discovered from step 1 are reviewed.

For these reasons, a qualitative approach is utilised to discover outcomes such as meaning, opinion, experience, or unexpected phenomena. A qualitative method is focused on the richness, texture, and/or feeling of raw data with an inductive approach emphasising the development of insights and generalisations out of the data collected (Neuman and Kreuger, 2003). Instead of trying to convert social life into variables or numbers, qualitative researchers borrow ideas from the people they study and place them in the context of a natural setting (Creswell, Plano Clark, Gutmann and Hanson, 2003, Guba and Lincoln, 1994). The next chapter (Research Methodology) will describe the characteristics of the qualitative approach and its role in this research study.

Richness of measure	**Rich** ***(IS, User)***	**Rich** ***(IS, Task)***	**Very Rich** ***(IS, User, Task)***	**Very, Very Rich** ***(IS, User, Usage, Task)***
Type	Extent to which the user employs the system	Extent to which the system is used to carry out the task	Extent to which the user employs the system to carry out the task	How the user employs the system to carry out the task
Domain of content measured	**Usage** System User Task	**Usage** System Task User	**Usage** System User Task	System **Usage** User Task
Example	Cognitive absorption	Variety of use (number of subtasks)	None to date (Difficult to capture via a reflective construct)	**Qualitative data and methods**
Reference	Agarwal and Karahanna (2000)	Igbaria et al. (1997)	Burton-Jones and Straub (2006)	

The Conceptual Research Framework

Figure 10 The Conceptual Research Framework (Very, Very Rich) ***extended from Rich and Very Rich Measures of System Usage (Burton-Jones and Straub, 2006, Agarwal and Karahanna, 2000, Igbaria et al., 1997)***

The core elements of the framework are described in the following sections:

2.9.1 System

A system is a set of elements or components that interact to accomplish a goal (Stair, Reynolds and Reynolds, 2009). Generally, a computer-based information system (CBIS) is a single set of hardware, software, databases, telecommunications, people, and procedures that are configured to collect, manipulate, store, and process data into information; a company's payroll, order entry, or inventory control are examples of CBIS (Stair et al., 2009). Understandably, a system is described as the hardware, software, application tool, or a combination of these technologies. In short, the main purpose of a system is designed for helping or supporting users complete their work. In the case of this research, the primary type of system is a SAMS.

2.9.2 Task

Tasks are defined in terms of the behavioural responses a person should emit in order to achieve some specified level of performance (Wood, 1986). In an organisation, each job has functions or tasks associated with it (Dumas and Redish, 1999). In order to develop a useful product, the system's analyst and designer have to understand the nature and content of each job and how the users do the tasks that constitute the job (Dumas and Redish, 1999). This can be compared with the theory of Task-Techology Fit discussed in section 2.7.4.

2.9.3 User

A person can play several roles and thereby represent several actors, such as computer-system operator or end user (Jacobson, Christerson, Jonsson and Overgaard, 1992, Lee and Xue, 1999). Consequently, the concept of 'use' implies the related concept of a 'user' (Beynon-Davies, 2002), as a user as one who operates or exploits something (Oxford, 2004). In the context of a university, academic staff, administrative staff, students and system managers are all considered to be the users.

The next section will describe in detail Burton-Jones and Straub's model and how it relates to this research.

2.10 The Aspect of System Usage

The Concise Oxford English Dictionary (2004) defines ‘usage’ as the action of using something or the fact of being used. Many previous studies of system usage define usage as the action or interaction of use of the system (objective). The acts of use reflect how well or how badly the product or the system would perform. In system design and development, system analysts apply functional analysis to determine the set of usage activities.

Burton-Jones (2005) proposes that system usage is an activity that involves three elements: user, system, and task (Figure11). According to Cronbach (1971) cited by Burton-Jones and Straub (2006) “system usage is a complex activity involving a user, IS, and task over time; therefore, it has a broad universe of content”. For example, usage is described as the process of using a system. Burton-Jones and Straub (2006) state that “individual-level system usage is an individual user’s employment of one or more features of a system to perform a task”. However, it is the users who will be committed to using the system (Damodaran, 1996). In this way, the user is defined as a person who uses a computer system that includes a novice user as well as an expert user. A user can be described as an individual or many individuals in a group who engage with the task and system. It was mainly the primary user and their client who were affected through the user’s organisation, who may also be seen as a stakeholder (Basden, 2006) and a group of stakeholders. For instance, stakeholder groups are social groups having a ‘stake’ in, and potentially a degree of influence over, the development of some information system (Beynon-Davies, 2002).

A common definition for a task is “an activity performed to reach a certain goal” (van Welie, van der Veer and Eliëns, 1998). A task is also called ‘activity’ or ‘work’. It takes place over a period of time and generally consumes resources. Tasks are executed in a certain order and the completion of one task can trigger the execution of one or more other tasks (van Welie et al., 1998). Technologies are viewed as tools used by individuals in carrying out their tasks (Goodhue, 1995), whereas a system is an integrated set of computer programs designed to serve a particular function that has specific input, processing and output activities (e.g., general ledger, manufacturing, resource planning, human resource management).

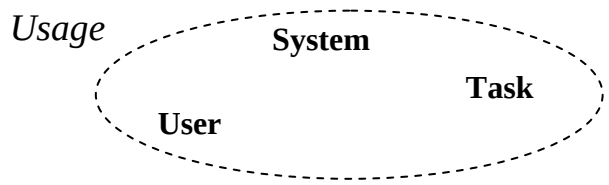

Figure 11 The Conceptual Framework of System Usage *(Burton-Jones and Straub, 2005)*

2.11 Summary

Since the beginning of the ERP era, a growing number of Higher Education Institutions (Heiskanen et al.) worldwide have explored Enterprise Resource Planning systems (ERP) as a means of supporting their organisational management processes. Specifically, Student Administrative Management Systems (SAMS) have been designed to improve administrative services for tertiary institutions, schools, colleges, students and employees. Similarly, Australian and Thai universities have implemented SAMS to improve and update their administrative management processes.

According to the literature, there have been a number of successes and failures of university ERP implementations, and the reported successes are few. The difficulties and high failure rate in implementing ERP systems have been discovered by many researchers and they have differentiated between: management issues related to ERP implementation; impact on organisation; relations between ERP use and best practices in management; and finally the cultural issues that arise in ERP use. The organisation influences the choices in IS implementation which will eventually impact on the use of the IS application. Consequently, users create their own strategies to cope and handle these limitations. The ideal of improvisation is to support and minimise problems or constraints emanating from the system or IT implementation. A manual workaround is an alternative method that can support users in their tasks, where it overcomes barriers or problems arising from system issues.

This chapter reviewed the literature to describe the existing knowledge base for this thesis. Generally, the literature confirms certain findings and conversely, these findings can be used to illustrate where the literature is incorrect, is overly simplistic, or only partially explains phenomena. Bringing the literature into the research not only demonstrates scholarliness but also helps extend, validate, and refine knowledge in the field (Strauss and Corbin, 1998).

Moreover, the literature is also a point of departure for the arguments which may arise during the study as a contribution to new knowledge (Strauss and Corbin, 1998). In this way, the literature is important for researchers in order to understand the relevant studies and what exists as a consequence of previous analyses. In this review the conceptual model was presented and it emerged from the research objectives. Specifically, this review provides an understanding of the significant issues related to the type of ERP system which is known as SAMS in universities.

To overcome the lack of explicit conceptualizations of system usage in past research, Burton-Jones (2005), present his study for reconceptualising system usage that involves identifying the relevant elements of usage for a research context (i.e., IS, user, and/or task) and identifying measures for these elements based on the other constructs in the nomological network. Consequently, the research extends the Burton-Jones (2005) framework into the new approach as 'Very, Very Rich'. As the emphasis of the research study will focus on the richness of data that emerges from the qualitative study of system, user, and task. The following chapter will describe the research methodology and the research components employed in this study.

3 Research Methodology

This chapter discusses and justifies the research paradigms, research issues, and methodologies employed in this thesis. It discusses the issues centred on the research design. When utilising a research design, researchers are expected to carefully select an appropriate underlying assumption. Generally, a research methodology is a set of methods for collecting and analysing their data (Arunthari 2005).

Wiersma (1995) defines "research design as a plan or strategy for conducting the research", and it "is intended to deal with matters such as selecting participants for the research and preparing for data collection, activities that comprise the research process". Guba and Lincoln (1994) propose that "it is understood and accepted that the researcher's understanding is based on values, culture, training and experiences that he brings to the research situation and that this might be different from those of the participants in the situation". Although no construction is or can be incontrovertibly right, advocates of any particular construction must rely on persuasiveness and utility rather than proof in arguing their position (De Vaus, 2001). According to De Vaus (2001, p. 10), "research design links the data to be collected and conclusions to be drawn to the initial questions of the study – it provides a conceptual framework and an action plan for getting from questions to a set of conclusions". Consequently, it is necessary to understand where the design fits into the whole research process from forming a question to finally analysing and reporting data (Hunter, Hari, Egbu and Kelly, 2005). Whiteley (2004) notes that the research design must create an audit trail so that the research activities can be confirmed to what process the researcher actually used.

3.1 Research Paradigms

According to Guba and Lincoln (1994) 'Paradigms' are regarded as the worldviews or belief systems that guide researchers. Particularly, "In the field of science the consensual set of beliefs and practices that guide a field is typically referred to as a paradigm" (Creswell et al., 2003). Paradigms have "become a central concept in social science research methodology, which emphasises metaphysical issues related to the nature of reality and truth" (Brannen and Coram, 1992). To ensure that a research design is valid, researchers must choose one that is congruent with their beliefs about the nature of reality (Bennett, 2004). However, prior to choosing the research approach, it is necessary to consider some underlying assumptions about how to perceive knowledge and acquire it (Creswell et al., 2003). Clearly, it is important for anyone considering employing a certain research method to be aware of the potential benefits and risks beforehand, and to know in which set of circumstances it might or might not be appropriate (Goede and de Villiers, 2003). In theory, information systems research classifies as positivistic, interpretive or critical. These three paradigms can be adopted independently or in combination (Neuman and Kreuger, 2003). Thus, this thesis briefly discusses these paradigms in the following subsections:

3.1.1 Positivist Paradigm

Positivist social science is used widely, and positivism, broadly defined, is the approach of the natural sciences (Arunthari, 2005). Positivists view the social world as one of natural phenomena (Neuman and Kreuger, 2003). Positivist researchers prefer precise quantitative data and often use experiments, surveys, and statistics (Oliver, 2004), i.e. methods that record and measure observable facts and events (Arunthari, 2005). Neuman and Kreuger (2003) contend that "positivist research seeks rigorous, exact measures and objective research, and hypotheses are tested by carefully analysing data from the measures" (p. 82). Therefore, the positivist paradigm typically uses quantitative measurement and statistical analysis (Oliver, 2004), where measurable data can be collected using such tools as questionnaires and structured interviews (Saunders, Lewis and Thornhill, 2007).

3.1.2 Interpretivist Paradigm

Saunders et al. (2007) state that "Interpretivism is an epistemology that advocates that it is necessary for the researcher to understand differences between humans in their role as social sectors" (p. 24). Neuman and Kreuger (2003) define it as follows: it "is the foundation of social research techniques that are sensitive to context, that use various methods to understand the ways others see the world" (p. 83). As well as social science, interpretive research is concerned with how people interact and get along with each other (Oliver, 2004). Methodologies used in the interpretivist paradigm are mainly qualitative rather than quantitative, and often involve field work for evidence gathering (Arunthari, 2005). Interpretive researchers often use participant observations and field research to acquire an in-depth understanding of how meaning is created in everyday life (Neuman and Kreuger, 2003).

3.1.3 Critical Paradigm

Critical research aims to help eliminate the causes of unwarranted alienation and domination and thereby enhance the opportunities for realising human potential (Neuman and Kreuger, 2003). Goede and de Villiers (2003) contend that "one can classify IS research as critical if the main task is seen as being one of social critique, whereby the restrictive and alienating conditions of the status quo are brought to light" (p. 209). In general, critical social science defines social science as a critical process of inquiry that goes beyond surface illusions to uncover the real structures in the material world in order to help people change conditions and build a better world for themselves (Neuman and Kreuger, 2003). Arunthari (2005) suggests that "critical IS research is more strongly directed towards uncovering the oppositions, conflicts and contradictions in contemporary society" (p. 16). Therefore, it is often adopted by community action groups, political organisations and social movements (Neuman and Kreuger, 2003).

3.2 Type of Research

In theory, there are three different types of research that are usually employed in social science research. These types of research are classified below.

3.2.1 Exploratory Research

When researchers have limited experience or knowledge about a research issue, exploratory research is a useful step (Neuman and Kreuger, 2003). The study then can be categorised as 'exploratory' research. Exploratory research may be the first stage in a sequence of studies (Zikmund and Babin, 2007) which often involves qualitative methods (Saunders et al., 2007). "It is particularly useful if researchers or users wish to clarify their understanding of a problem, such as if researchers are unsure of the precise nature of the problem" (Neuman and Kreuger, 2003). The goal of exploratory research is to formulate more precise questions that future research can answer (Zikmund and Babin, 2007). Neuman and Kreuger (2003) conclude that "a researcher may need to conduct an exploratory study in order to know enough to design and execute a second, more systematic and extensive study". Saunders et al. (2007) postulated three principal ways of conducting exploratory research: a search of the literature; interviewing an 'expert' in the subject; conducting focus group interviews.

3.2.2 Descriptive Research

Descriptive research is elemental to many research foundations. It adds enormous value to human knowledge of the evaluation and nature of human society. De Vaus (2001) states that research encompasses much government-sponsored research including the population census, the collection of a wide range of social indicators and economic information such as household expenditure patterns, time use studies, employment and crime statistics, and the like. Robson (2002) defines the object of descriptive research as portraying "an accurate profile of persons, events or situations" (p. 59). Descriptive research addresses who, what, when, where, and how questions (Saunders et al., 2007). Neuman and Kreuger (2003) see descriptive research as presenting a picture of the specific details of a situation, social setting, or relationship. This may be an extension of, or a forerunner to, a piece of exploratory research or a piece of explanatory research (De Vaus, 2001). As a result, descriptive research is most widely used in social research analyses.

3.2.3 Explanation Research

Explanation Research focuses on 'why' questions (Yin, 1994). This is because the 'how and why' questions deal with the operational links needing to be traced over time rather than mere frequencies or incidence and likely to lead to the use of case studies, histories, and experiments (Neuman and Kreuger, 2003). It builds on exploratory and descriptive research and goes on to identify the reason why something occurs (Saunders et al., 2007). Neuman and Kreuger (2003) state that "going beyond focusing on a topic or providing a picture of it, explanatory research looks for causes and reasons such as why and how questions". Explanation research emphasises studying a situation or a problem in order to explain the relationships between variables, for example a case study strategy in examining three organisations in some detail (Willis and Trondman, 2000).

3.3 The Selection of Research Paradigm

This study employs discussions or suggestions emanating from the literature to justify the research objectives, since this research agrees that:

- While case studies may achieve excellent internal validity by providing a profound understanding of a case, they have been widely criticised as lacking external validity (Tellis, 1997a). All the major researchers in the field, have stated that case study research is not sampling research (Tellis, 1997a). This way, selecting cases must be done so as to maximise what can be learned in the period of time available for the study (Adam and Wood, 1999).
- The antecedent IS models and theories from the literature were mainly designed, developed, and conducted using the quantitative approach. The results are not suitable for providing the richness and in-depth understanding required for the purpose of this research study. In order to answer and understand the 'how' question, the research has to collect data using qualitative methods.
- Selecting a qualitative approach led to adopting grounded theory emerging inductively with findings based on data (Hunter et al., 2005). Theory derived from data is more likely to resemble the 'reality' than is theory derived by putting together a series of concepts based on experience or solely through

speculation (Dimmock and Walker, 1998). An annotated bibliography of ERP publications that have been published in the main information systems journals and conferences and reviews, prepared by Esteves and Pastor (2001), concluded that:

- Even adequate ERP implementation methodologies were pointed out as critical success factors; however, there is a lack of studies about definition, usage and adequacy of these methodologies and their value in ERP projects.
- When most organisations start the implementation phase, many issues arise, focusing mainly on the technology. The ERP impact on organisations at all levels (technological, organisational, and business) should also be analysed.
- An important issue is how universities deal with ERP evolution. With respect to ERP adoption and usage by universities, studies related to all the phases of the ERP life cycle could be undertaken.

- Dimmock and Walker (1998) pointed out that: "Comparing educational administration across cultures also has intrinsic merit in its own right as a worthwhile intellectual activity aimed at improving understanding of educational activities in different places" (p. 385). Therefore, a further benefit of a comparative approach is a better understanding of the nature of relationships within education and between education and the wider society (Dimmock and Walker, 1998).

The purpose of this research is to explore the usage of SAMS and its effect on the user groups such as students and staff in the universities. In this selection, the research looks at the exploratory paradigm to discover and understand how SAMS is being used by different user groups in different universities. As a result, a comparative approach would be appropriate in the evaluation of systems in organisations which could bring further understanding of any differences or similarities between the two universities. A case study methodology was selected as the method as it enabled the researcher to easily investigate and being able collective data from different user groups. In addition, the use of a qualitative method enabled in-depth understanding when collecting data from the participants As such, an interpretive paradigm traditionally uses qualitative research methods to seek out explanations

and to develop an understanding of social and organisational contexts (Goede and de Villiers, 2003, Klein and Myers, 2001). As a result, this research describes its methodologies in the following sections.

3.4 The Research Design

The research design for this study consists of three phases.

Phase 1: The first phase was to conduct a qualitative study using a series of focus groups and personal interviews. This part also involved the design of research questions and data collections. Although before the data collections began, the research questions were tested by organising two pilot interviews with staff from the School of Business IT & Logistics (one administrative and one academic). This process was intended to test whether the research questions were relevant and valid for the research. In this way, the pilot phase also allowed the researcher to gain some understanding and background of SAMS, its users and their tasks. The pilot testing provided a starting point and directional pointer for conducting the research. The results allowed the researcher to perceive the possible impacts of system usage, and provide for a comparative study. Then, the data collection phase started and involved multiple sets of focus groups and interviews which began at the Australian University and followed by the Thai University. After that was completed, the second phase was carried out, transcribing data and conducting an analysis by applying grounded theory as the research method.

Phase 2: In the second phase, NVivo from QSR International was employed as the tool which helped the researcher to categorise and organise the concepts emerging from the data. This process also included the grounded theory approach for evaluating the data. Hence, the research presents the analysis and category of concepts as well as the theory emerging from the research findings. As the result from the analysis, this phase presents the concepts of the empirical findings based on an analysis of SAMS usage at AU and TU.

Phase 3: Consequently, the third phase was performed by collecting the secondary data using the method of interview and observation. In this phase, using the same set of research questions, the secondary interviews were conducted. Then, the researcher began to observe

the users, e.g. students, administrative staff and academic staff while they used the systems. As well, the comparative study was composed to identify the differences between the two universities. In order to retain the confidentiality of the research site and people involved, the research described both universities as AU (Australian University) and TU (Thai University).

Figure 12 below illustrates the three phases of the research study. The data collection started in the first phase at AU and TU, followed by the second stage of the analysis and the classification. The third phase was processed as the consequence of theory development. Finally, the comparative study was applied to conclude the findings from both universities.

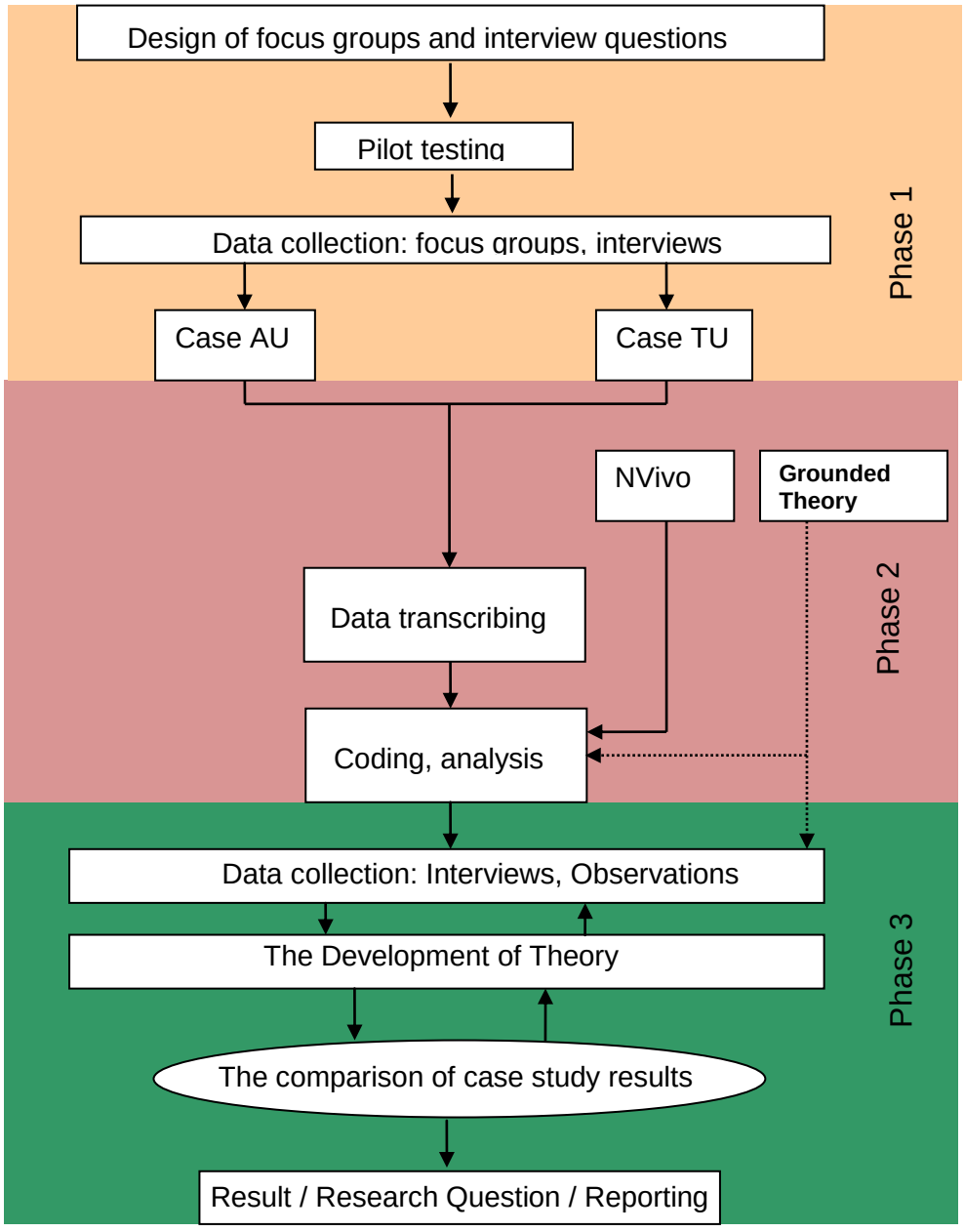

Figure 12 Research Design Processes

3.5 Qualitative Research

It is also useful to consider the epistemology of qualitative research before discussing the components of qualitative research design (Wiersma 1995). Webster's Dictionary (1913) defines epistemology as the theory or science of method or ground of knowledge. Wiersma (1995) states "that the epistemology of qualitative research provides the underpinnings for how qualitative research is conducted, how data is collected and analysed, and how conclusions are reached". In theory, qualitative research methods involve the systematic collection, organisation, and interpretation of textual material derived from the spoken word or observation (Brannen and Coram, 1992). Brannen adds that "Qualitative investigation is often viewed as an intensive or micro-perspective which relies upon case studies or evidence gleaned from individuals or particular situations but it can, as we shall see, be large scale" (Brannen and Coram, 1992). Qualitative researchers use a language of cases and contexts, employ bricolage, examine social processes encased in their social context, and look at interpretations or the creation of meaning in specific settings (Neuman and Kreuger, 2003). Indeed, "qualitative researchers believe that rich descriptions of the social world are valuable" (Denzin and Lincoln, 2000). "The goal of qualitative research is understanding issues or particular situations by investigating the perspectives and behaviour of the people in these situations and the context within which they act" (Kaplan and Maxwell, 2005). They are, moreover, "more concerned about issues of the richness, texture, and feeling of raw data because their inductive approach emphasises developing insights and generalisations out of the data collected" (Neuman and Kreuger, 2003).

The qualitative approach is employed to discover outcomes such as meaning, opinions, experiences or unexpected phenomena from individuals or groups. It is more researcher-dependent in that the researcher must extract meaning from unstructured responses (Malterud, 2001), such as text from a record interview or a collage representing the meaning of some experience. Malterud (2001) concludes that:

> *The researcher must be prepared to use strategies for questioning findings and interpretations, instead of taking them for granted; assessing their internal and external validity, instead of judging them obvious or universal; thinking about the effect of context and bias, without believing that knowledge is untouched by the*

human mind; and displaying and discussing the processes of analysis, instead of believing that manuals grant trustworthiness.

In this way, a qualitative case study can clearly represent a transparent outcome. This is the opportunity to achieve high levels of construct validity (Bennett, 2004), and quality.

3.6 Case Study Approach

A case is the 'object' of study; it is the unit that we seek to understand as a whole (Huberman and Miles, 2002). The case study is a research strategy focusing on understanding the dynamics present within single settings (Yin, 1989). Case study research is most appropriate when researchers are interested in learning 'how' and 'why' something occurs, when the research focuses on contemporary events, and when no controls of behavioural events are necessary (Saunders et al., 2007). It also has considerable ability to generate answers to the 'what' questions that tend to be more the concern of the survey strategy (Tellis, 1997b). Tellis (1997b) concludes that case study also has distinctive characteristics that make it ideal for many types of investigations in combination with other methods. Another strength is that the method enables a researcher to include both qualitative and quantitative research, and actually need not include "direct, detailed observations as a source of evidence" (De Vaus, 2001). Yin (1994, cited in Tellis, 1997), identified some specific types of case studies: Exploratory, Explanatory, and Descriptive. Tellis (1997b) concludes that exploratory cases are sometimes considered as a prelude to social research; explanatory case studies may be used for casual investigations; and descriptive cases require a descriptive theory to be developed before starting the project.

This being a study of the impact on management of the same ERP implementation, but within a different area of the universities, it is helpful to distinguish between cases as a whole and cases that consist of various levels or components (De Vaus, 2001). Yin (1989, cited in De Vaus, 2001) uses the terms 'holistic' and 'embedded' designs to refer to this distinction. This research's objectives can be conceived of the 'holistic' level where the study focuses on characteristics of the universities applying to that level. For example, a school as a case includes teaching staff, administrative staff, staff at different levels of seniority and they experience students, students at different year levels, etc. (De Vaus, 2001). Yin (1994) also suggests that "the case should be selected in the same way as the topic of experiments is

selected, and developing preliminary theory is used as a template with which to compare the characteristics and empirical findings from the case(s)" (p. 2). According to Zikmund and Babin (2007) "a primary advantage of the case study is that an entire organisation or entity can be investigated in depth with meticulous attention to detail" (p. 88). Therefore, this research study agrees and admits that the case study approach is appropriate for investigating the cases and related phenomena.

3.6.1 Single Case Study

A case study can involve either single or multiple cases, and numerous levels of analysis (Saunders et al., 2007). In general, a single case study describes a situation as a phenomenon. According to De Vaus (2001, p. 226) "single case design will normally be less compelling than multiple case designs". It is often used where it represents a critical case or, alternatively, an extreme or unique case (De Vaus, 2001). This highly focused attention enables the researcher to carefully study the order of events as they occur or to concentrate on identifying relationships among functions, individuals, or entities (De Vaus, 2001). Thus, this can be appropriate when the researcher has a clear theory with well-formulated propositions and the researcher has a single case that meets all the requirements of the theory (Tellis, 1997a). Yin (1989, cited in De Vaus, 2001) concludes that "such a case can provide a moderately convincing test of a complex theory" (p. 227). In particular, a single case study is desirable for many researchers because it can quickly arrange and reach a conclusion from a situation. However, a single case may not be enough to provide sufficient evidence or insight into the situation in comparison to multi-case studies.

3.6.2 Multiple Case Studies

Dimmock and Walker (2000) have written: "In building a comparative and international branch of educational management, it is necessary to make a convincing case for an appropriate theoretical or conceptual foundation" (p. 146). Yin (1994) cited in Saunders et al., (2007) includes that using multiple sources of evidence will ensure construct validity. The rationale for using multiple cases focuses on the need to establish whether the findings of the first case occur in other cases and, as a consequence, the need to generalise from these findings (De Vaus, 2001). As a result, "multiple cases, strategically selected, can provide a

much tougher test of a theory and can help specify the different conditions under which a theory may or may not hold" (De Vaus, 2001). In this way, "multiple case designs will normally be more powerful and convincing and provide more insights than single case-design" (De Vaus, 2001). In short, in terms of the validity and justification, multiple cases can clarify and enhance the findings' results.

3.7 Comparative Approach

Comparison is a fundamental tool of analysis (Brislin, 1976). It lies at the heart of human reasoning and is always there in the observation of the world: "thinking without comparison is unthinkable" (Cunningham, 1997). Collier (1993) adds that "it sharpens the research power of description, and plays a central role in concept-formulation by bringing into focus suggestive similarities and contrasts among cases" (p. 105). The most obvious comparative strategy is to select cases that initially differ on some variable of interest as part of the research design (Schofield, 2002). For instance, the research develops an explanation for one case or set of cases and then replicates this process with a similar case or set of cases (Collier, 1993). Moreover, if one were studying numerous very different classrooms and found that student achievement gains were high in some and quite low in others, one could compare these two sets of classrooms as a strategy for trying to suggest factors that contribute to high or low gains (Schofield, 2002). When comparing the case with another or more cases, the results would increase and contribute to the new knowledge and innovation. Usually, a case is unique in itself. In most cases, the objective of comparison is to discover and identify the differences and similarities between the case studies. In this research, "the comparison is highly regarded because it increases the internal validity of the findings" (Boeije, 2002). Boeije (2002) concludes that "the cycle of comparison and reflection on 'old' and 'new' findings can be repeated several times" (p. 393). For instance, "when new cases do not bring forth any new information to light, the findings (categories) can be described as saturated" (Boeije, 2002).

This comparative strategy is quite powerful, especially if there is heterogeneity among cases within each of the categories of interest (Schofield, 2002). Country case studies would be appropriate to justify the comparative approach, for a cumulative and well contextualised understanding of a particular region (Collier 1993). According to Locke and Thelen (1998)

cited in Bennett, (2004), "one of the greatest strengths of case studies is to carry out 'contextualised comparison' or comparison that 'self-consciously' seeks to address the issue of equivalence by searching for analytically equivalent phenomena, even if expressed in substantially different terms across different contexts".

3.8 Research Strategy (Data Collection Method)

Data collection is considered the critical part of the research. It defines the approach and conduct of the research. Data collection describes the method of collecting data, and the researcher must ensure that the method is appropriate for the research objectives. Some techniques are more effective when addressing specific kinds of questions or topics (Taylor and Bogdan, 1998). Otherwise, the goal is to use each method so that it contributes something unique to the researcher's understanding of the phenomenon under study (Morgan 1997). To illustrate, the research strategies used in this study are as follows.

3.8.1 Focus Group

A focus group is one of the data collection methods accomplished by conducting an interview with a group of participants. In group interviewing, as opposed to one-to-one interviewing, a researcher must act as a group facilitator and moderator, managing interactions between members of the group (Crowley, Leffel, Ramirez, Hart and Armstrong, 2002). Historically, focus group studies have been associated with the corporate world as an information-gathering tool used in market research (Merton and Kendall, 1946). The goal of a focus group is to gain a clearer insight into a particular situation or group, as it exists in its native environment (Crowley et al., 2002). Any of the ideas or answers that emerge can be expanded from other (participants) members. This encourages further adaptation and eventual acceptance of the focus group study as an acceptable qualitative research methodology (Crowley et al., 2002). Therefore, "the method is particularly useful for exploring people's knowledge and experiences and can be used to examine not only what people think but how they think and why they think that way" (Kitzinger, 1995).

Focus groups provide a number of advantages (Litosseliti, 2003). Based on discussions by Morgan and Kruger (1993), Kruger (1994), Gibbs (1997), and Morgan (1998), the approach gives rise to the following advantages (Litosseliti, 2003):

- Discovering new information (e.g. about a new product) and consolidating old knowledge (e.g. examining people's habits);
- Obtaining a number of different perspectives on the same topic, in participants' own words;
- Gaining information on participants' views, attitudes, beliefs, response, motivations, and perceptions on a topic; 'why' people feel the way they do;
- Examining participants' shared understandings of everyday life, and the everyday use of language and culture of particular groups;
- Brainstorming and generating ideas, with participants discussing different angles of a problem, and possibly helping to identify solutions;
- Gaining insights into the ways in which individuals are influenced by others in a group situation (group dynamics);
- Exploring controversial issues and complex or sensitive topics.

However, "a focus group should not be used for topics which are unfamiliar to the participants, which do not encourage different perspectives, and which may hinder free-flowing talk and interaction" (Litosseliti, 2003). The limitations of the focus group methodology are summarised below (Litosseliti, 2003), which are also based on discussions by Morgan and Kruger (1993), Kruger (1994), Gibbs (1997), and Morgan (1998).

- Bias and manipulation: danger of leading participants and encouraging them to respond to the researcher's own prejudices, with participants saying what they think you want to hear;
- 'False' consensus: some participants with strong personalities and/or similar views may dominate the discussion, while others may remain silent;
- Difficulty in distinguishing between an individual view and a group view: groups sometimes appear more consistent than they are because individuals who disagree may not say so; groups often generate more emotion than any of the individual participants may feel about the issue; individual behaviour is subject to group influence;

- Difficulty in making generalisations based on the focus group information (not only because of the limited number of participants, but also due to the difficulty of having a really representative sample);
- Difficulty of analysis and interpretation of results (due to the open-ended nature of focus groups, and the influence of many immediate situational factors).

Litosseliti (2003 p. 19), citing Morgan (1998), believes that because of "this process of sharing, asking, doubting and reconsidering, the researcher and/or moderator may have less control over the interaction and the data produced, compared to interviewing or quantitative studies". Yet "focus groups that are carefully planned and skilfully moderated, ensure that this lack of pre-determination can be an advantage rather than a disadvantage" (Litosseliti, 2003). The strongest point of a focus group is the fact that someone can gather data in a social context where participants have the ability to consider their own views in relation to the views of others (Morgan, 1997). In addition, the focus group would provide more strength and support to an idea and agreement than that derived or emerging from a group of participants, rather than from an individual interview. As the intent was to explore and understand how users recognised and employed SAMS, the focus group interview was selected as the main method for this research.

3.8.2 Interview

In general, a personal interview provides some benefits over the focus group as the quickest method for collecting data from an interviewee or participant. However, Morgan (1997) notes "the points of contact between individual and group interviewing and put forth the broad argument for combining the two within research projects as a way to explore the most effective uses for each method" (p. 22). For instance, a preliminary focus group can provide a useful starting point for individual interviews that involve unfamiliar topics or informants (Morgan, 1997). On the other hand, Morgan (1997) suggests that using "preliminary individual interviews can help generate focus group discussion guides by giving a feel for how people think and talk about the topics that the groups will discuss" (p. 222). In particular, either method can be used in either a preliminary or follow-up capacity with each other, regardless of which method is the primary means of data collection (Taylor and Bogdan, 1998). In some cases, interviews can be used as a method for learning about events and

activities that cannot be observed directly (Zikmund and Babin, 2007). Moreover, Zikmund and Babin (2007) include that "depth interviews are particularly advantageous when some unique or unusual behaviour is being studied" (p. 96). Simultaneously, by trying to establish rapport with informants, one may ask non-directive questions early in the research, and learn what is important to informants before focusing on the research interests (Mack and Woodsong, 2005). Although this research design has relied on focus groups as the primary source of data, the research also applied the personal interview as an additional method for collecting data from particular participants. Although interview can provide versatile and flexible approaches, however the interview method has some disadvantages. According to Zikmund and Babin (2007) define personal interview is expensive which more costly than survey. Moreover, "Respondents are not anonymous and as a result may be reluctant to provide confidential information to another person" (Zikmund and Babin 2007, p 36). As a result, control over interview is important to reduce the exertion and constraint as much as possible (Zikmund and Babin 2007).

In this research, the number of users, such as IT or IS manager, was also limited due to the nature of the user and position held. In this instance an interview approach is the appropriate method for collecting data from these people. For instance, the researcher had conducted two pilot interviews for testing the data collection questions.

3.8.3 Observation

For the purpose of research validity, the research has utilised observation to investigate the likelihood of data gaps as a result of the interviews. This aspect provides an opportunity to review the current state of the research findings as the secondary data source, and also helps to clarify the concepts or themes that may overlap during the first data collection. For instance, using observational data could provide additional information which helps the researcher to gain a deeper understanding about how the users employ the system. In general, the observation of participants is extremely useful in providing initial insights and hunches that can lead to more careful formulations of the problem and an explicit hypothesis (Bryman, 1992). Zikmund and Babin (2007) state that "observational research is advantageous for gaining insight into subject areas that respondents cannot or will not articulate" (p. 97). Data obtained through participant observation serves as a check against participants' subjective

reporting of what they believe and do (Mack and Woodsong, 2005). The method is distinctive because the researcher approaches participants in their own environment rather than having the participants come to the researcher (Kaplan and Maxwell, 2005). As Zikmund and Babin (2007) have written, the "main advantage of the observation technique is that it records behaviour without relying on reports from respondents" (p. 54). In this process, the observer asked questions to clarify what is taking place and to engage in informal discussion with system users, as well as to record ongoing activities and descriptions of the setting (Danya International, 2002). In theory, this approach is referred to as the 'think aloud' method. It is a usability evaluation method employed to gain insight into how people work with a product or interface (Guan et al., 2006) and therefore suitable for this research. However, observation method raises the issue of the respondent's right to privacy (Zikmund and Barbin 2007), that needs for carefully approach. For instance, an observer should obtain a form of permission (consent) before collect data.

3.9 Design of the Focus Group and Interview Questions

A research question is a statement that identifies the phenomenon to be studied (Marshall, 1996). In this way most of the interview questions are considered as guidelines and a control mechanism for researchers to conduct and focus on their studies. To develop the set of questions, the literature study yielded an understanding and insights in the field of the research, and their implications such as the impacts, constraints and phenomena involved. This study has established eight main questions exploring the users' perception and usage of the SAMS (see Appendix C). In the beginning, the first research question proposed to open with an understanding of how the users perceived the systems. This question was generally helpful for highlighting respondents' experiences and ideas. It also encouraged them to express their feelings about the phenomena and experiences. The secondary question intended to capture the users' opinions when they operate the system. In this way, the researcher can also gain an understanding of the users' positive or negative experiences and thus perceive the factors affecting their usage. The third question was designed to explore the relationship between the system and the task. Again, the answer provided the reason why users employ the systems.

According to the category of users, the fourth question substantively focuses on whether the system is important or is needed by the users to do their work and/or specific tasks. The answer also helped to discover the factors that may lead to the (positive or negative) impacts on the system usage. The fifth question was designed to focus on whether the users created or used any alternative option so that they could complete their tasks. Although this question may be considered similar to the last question, it was more specific in seeking to discover the user's perception as to the terms of usage or practice that may emerge. Thereby, both questions would help the researcher to discover how these users employed the system. The sixth and seventh research questions intended to discover if there were any constraints or availabilities regarding the SAMS that might impact on the users and their usages. For these reasons, the research can also identify the users' perceptions and their experiences of SAMS usages. Despite the constructed research questions being based on knowledge gained from the literature and some background experiences, however, no biases will affect, dominate or influence this study.

3.10 Research Sample Size

Choosing a study sample is also an important step in any research project since it is rarely practical, efficient or ethical to study whole populations (Luborsky and Rubinstein, 1995). The research presented is intentionally designed as a qualitative approach which carries out focus group interviews, individual interviews and observations as shows in Table 1.

Participant	AU	No. of participant	TU	No. of participant
Student	FG (L & I), OB	12, 2	FG (L & I), OB	13, 2
Administrative staff	FG, OB	7, 2	FG, OB	6, 2
Academic staff	FG, OB	6, 1	FG, OB	6, 1
IS manager staff	IV	2	IV	1

Table 1 The participants of AU and TU

Note: FG (Focus group), L (Local student), I (International student), IV (Interview), OB (Observation)

The goal of sampling in this case is to produce the collections of individuals from whom the nature of their experience can be elicited through verbal description and narration. In preparation for the field study, the focus groups and interviews were conducted as

appropriate to a qualitative study. The population of each focus group ranged between 6 -13 participants. Regarding the number of IS/IT managers in the case studies, the research employed the personal interview as the method for data collection. As well, the research did not intend to observe the use of SAMS from IS/IT managers' perspectives. According to their tasks and responsibilities, these people therefore, were already competent in using SAMS. However, the same set of interview questions was used for the focus groups and interviews carried out in two universities (Australia and Thailand). There were a total of 62 participants (staff and students) from both institutions. The participants are categorised and briefly described in the following section.

3.11 The Participants

In the universities, staff and students use and interact with SAMS to perform their designated tasks. However, these users have different roles relating to their organisational position. Therefore, the users were selected according to their participation and roles in using the systems. The usage outcomes from different types of users are suggestive and indicative as to whether the same or different reasons apply concerning the effects of the systems on them. In this research, the literature defines the roles and the users who employ the systems, with reference to the approaches of Følstad, Jørgensen and Krogstie. (2004), and El-Kiki and Lawrence (2006). Their research studies revealed the following:

- Administrative staff refers to a core user who must use the administrative system as an important part of their work context.
- Academic staff refers to a regular user who interacts with the administrative system in their everyday work, but not as their primary task.
- Student refers to a sporadic user who has limited interaction with the administrative system in their work or everyday life.
- IS manager and/or IT manager refers to a technical support user who is competent and responsible for the daily maintenance and support of the administrative systems.

Section 4.1 in the next chapter will provide a detailed examination of the usage of SAMS by the various user groups, this section provides a high-level overview sufficient to address their relevance to the research.

A. Administrative Staff

Significantly, higher education institutions continue to make major commitments to using new information technologies to improve their administration processes (2006). Administrative staff use SAMS to create and manage student records. While maintaining and supporting all staff and students, administrative staff can benefit from using SAMS to organise their tasks such as workflow management, courses scheduling, student financial and payments, classroom booking, etc. In the administrative division, the system is heavily utilised for processing information. According to the nature of administrative tasks, administrative staff consists of people who mainly use and interact with the system more than others (see Chapter 4, Table 2: The frequency of SAMS usage).

B. Academic Staff

In universities, academics plays a key role in empowering students to access education, participate actively in the life of the institution and achieve successful and fulfilling lives beyond graduation (University, 2012). In this way, academics place new demands on the use of ICT such as learning new skills in developing and maintaining course and assessment materials (Oliver, 2001). For this teaching-related activity, the use of ICT has been very beneficial in helping tutors achieve their objectives (Kirkup and Kirkwood, 2005). In addition to such systems, Blackboard for example, provides a stable and consistent platform and a basis on which staff development, materials development and course delivery can be based (Kirkup and Kirkwood, 2005). However, according to academic tasks, most academics do not need or use SAMS as much as administrative staff, because academic staff can access the services and support that are usually provided by administrative staff. In general, academics use SAMS for accessing courses, programs, student enrolments and personal information.

C. Student

Students demand a higher level of access to information about their options, their performance, and their future (Macchiusi and Suzanne, 2001). There is a wide range of options here, from Computer-Assisted Instruction (CAI) or Integrated Learning Systems (ILS) packages at one extreme, to constructivist approaches that present the computer to the student as an environment for free experimentation and the development of creativity (Grant and Anderson, 2002). The library is another example of a place that many institutions have provided incorporating SAMS service for their students' learning support, generally with free access to resources that are critical to learning. Today, most students have online access to universities' services for searching materials, online learning, communicating, and classroom collaboration. Therefore, with electronic online enrolment, many students find the system is useful and performing well enough to do the job, though SAMS makes a huge impact on students and their work, as students are now spending more time on the Internet.

D. IS/IT Manager

ICT is an important facility for IS and support administration in most organisations. The administration of IS support that is needed for the day-today functioning of the IT services in higher educational institutions, includes security aspects (user access, confidentiality of membership and performance, etc.), network support, and the like (Kirkup and Kirkwood, 2005). The IS manager is responsible for the proper use of the environment, for connection problems, and for password reporting, and also introducing new users to the platform. With respect to SAMS, the IS manager assists and provides technical support to academics, administrative staff, and students.

3.12 Grounded Theory

Grounded Theory is a general, inductive and interpretive research method developed by Barney Glaser and Anselm Strauss in 1967 (Goede and de Villiers, 2003, Strauss and Corbin, 1998). The method they devised was labelled 'grounded theory' to reflect the source of the development theory which is ultimately grounded in the behaviour, words and actions of those being studied (Goulding, 2002). Selecting a qualitative approach led to the grounded

theory emerging inductively from findings based on data (Hunter et al., 2005). The inductive process tends to minimise the general ideas and seeks to identify the solid concepts that have emerged or are formed from the data. Proposed by Glaser and Straus (1967) the theory advocates the generating of theory that is 'grounded' in data rather than working with a preconception (Mansourian, 2006). Hunter et al. (2005) suggested that the researcher can approach the subject with some background knowledge, but it is important that the reading is not too extensive as the theories should evolve from the data itself. Glaser and Strauss (1967), cited in Adam and Wood, (1999) state that "grounded theory enables a theoretical framework to be drawn from the data and not from speculation or preconceived ideas" (p. 307). This is because "theory derived from data is more likely to resemble the 'reality' than is theory derived by putting together a series of concepts based on experience or solely through speculation" (Adam and Wood, 1999). During careful collection and analysis of data, an incident is represented by the coding of data. When many incidents occur, it must be compared and represented in categories. Arunthari (2005) postulates that "these processes continue until all categories are exhausted, which means until increasing the size of the sample yields no new themes, and the theory is validated" (p. 33). Hence, these categories are defined by Glaser and Strauss (1967) as 'the conceptual element of a theory' (Hunter et al., 2005).

The basis of the generation of the theory is a 'constant comparative' of data analysis (Holstein and Gubrium, 2003), that Glaser and Strauss (1967) referred to as a process of 'constant comparison', in which the researcher moved back and forth among the data and gradually advanced from coding to conceptual categories, and thence to theory development (Schreiber, 2001). According to the analytical processes and techniques – from the likes of Glaser and Strauss (1967), Strauss and Corbin (1990, 1998), McGhee, Marland and Atkinson (2007), Arunthari (2005), Harry, Sturges and Klingner (2005), Charmaz (2006) – the research describes the components of grounded theory definitions in the following terms:

1. *Open coding:* This is the interpretive and analytical process from the qualitative data (e.g. interview, observation). At beginning of an analysis, open coding is the discoverable process that identifies the categories from the data without the initial perception of concepts. This is to prevent being 'constrained' or 'contaminated', or otherwise inhibited from effectively generating categories, their properties and theoretical coding through prior reading of the relevant

literature (Arunthari, 2005). During open coding, data is broken down into discrete parts, closely examined, and compared for similarities and differences (McGhee et al., 2007). Strauss and Corbin (1998) define events, happenings, objects and actions/interactions that are found to be conceptually similar in nature or related in meaning; they are grouped under more abstract concepts termed ‘categories’.

2. *Category:* A category stands for a phenomenon, that is, a problem, an issue, an event, or a happening that is defined as being significant to respondents (Schreiber, 2001). Categories or concepts are a progression from merely describing what is happening in the data, which is a feature of open coding (Goulding, 2002). These results are called ‘incidents’. In this stage, the use of ‘memo writing’ is a benefit to the researcher in sparking fresh ideas, creating concepts, and finding novel relationships (Strauss and Corbin, 1998).
3. *Constant comparison:* When doing second-level coding, the researcher constantly compares the first-level codes against existing and incoming data and identifies categories that are then compared with data and codes (Strauss and Corbin, 1998). “Constant comparison involves comparing like with like, to look for emerging patterns and themes” (Goulding, 2002), comparing those incidents as applicable to each category, by coding each incident into many categories as possible. “By comparing where the facts are similar or different, the researcher can generate properties or categories that increase the categories’ explanatory power” (Goulding, 2002). At the same time, the process is constantly comparing all incidents within the same category in order to eliminate the incidents outside of the extent of the category.
4. *Property:* Often, subcategories called properties emerge in the open coding phase (Charmaz, 2006). It is the dimensions, relationships, and consequences within each category that have the ability to connect to other categories, although those categories connect to other categories through their properties.
5. *Theme:* This refers to the underlying message or stories of those categories, by determining which categories were predominant in the data, summarising their content until categories become saturated (Crook and Kumar, 1998). Glaser and Strauss (1967) describe reducing categories through uncovering similarities. It is the boundary of each category that contains the element of dimensions, relationships, concepts and similarities. A grounded theory researcher uses these

themes to discover their interrelationships. Furthermore, using a theme will help the researcher to control the extent of theory analysis. The results will provide a researcher with the basis to begin constructing the research theory.

6. *Saturation:* A category is also considered saturated when there is no new knowledge to further develop during the analysis, that is when no relevant properties, dimensions, conditions, actions/interactions, or consequences are produced from the data (Holstein and Gubrium, 2003). In theoretical saturation, the analysis is no longer discovering the new findings that spark new theoretical insights, nor reveals new properties of the core theoretical categories (Strauss, 1998).
7. *Axial coding:* The purpose of the axial coding phrase is to begin selecting the categories from the open coding phrase, and connecting them together. This is done by utilising a coding paradigm involving intervening conditions, context, action/interactional strategies and consequences (Harry et al., 2005). According to Strauss and Corbin (1990, p. 97), "in axial coding the focus is on specifying a category (phenomenon) in terms of the conditions that give rise to it; the context (its specific set of properties) in which it is embedded; the action/interaction strategies by which it is handled, managed, carried out; and the consequences of those categories". The model consists of a sequence of steps of the technique to define causal conditions, phenomenon, context, intervening condition, action/interaction strategies, and consequences. Using this model will enable the researcher to think systematically about data and to relate them in very complex ways (Strauss and Corbin, 1990, Pandit, 1996).
8. *Selective coding:* "This is the process of selecting the core category (central phenomenon), systematically relating it to other categories, and validating those relationships" (Charmaz, 2006), and filling categories that need further refinement and development (Strauss and Corbin, 1990).
9. *Literature:* Literature can be used as an analytical tool to simulate thinking about properties and for asking conceptual questions (Strauss and Corbin, 1990). Literature is also considered to be another source of collective notions and knowledge. In this way, a researcher may take advantage of using concepts from the literature to support the strength of the research findings. However, this process should be done when the core category and the findings have been

identified (Strauss and Corbin, 1998), in order to prevent bias as a characteristic of a grounded theory approach.

3.13 Rationale for Selecting of Grounded Theory

Certainly, there are other methods in qualitative research than grounded theory. However, grounded theory provides the flexibility to allow the researcher to focus on the study subject rather than the many available methods (Glaser, 1999). "Qualitative research, uses 'grounded theory' to investigate phenomena such as feelings, thought processes and emotions, which are difficult to study through quantitative methods" (Strauss and Corbin, 1998). However, "Glaser and Strauss do not regard the procedures of grounded theory as discipline specific, and they encourage researchers to use the procedures for their own disciplinary purposes" (Haig, 1995). In fact, "the importance of this methodology is that it provides a sense of vision, where it is that the analyst wants to go with the research" (Strauss and Corbin, 1998). The method is able to trace the broad concepts and then concentrate on refining the data. It is particularly flexible for the researcher to construct inductive relationships from the data. The flexible characteristics of grounded theory are outlined by Strauss and Corbin (1998, p. 7) as follows:

- The ability to step back and critically analyse situations;
- The ability to recognise a tendency toward bias;
- The ability to think abstractly;
- The ability to be flexible and open to helpful criticism;
- Sensitivity to the words and actions of respondents;
- A sense of absorption and devotion to the work process.

Strauss and Corbin (1998) suggest that researchers need not necessarily begin their first studies with these characteristics. They also postulate that "by carefully making use of the procedures outlined above, it is possible for the researcher to develop the means for bringing that vision into reality" (p. 8). This study deliberately admits that these characteristics are reasonable and useful as most of them seem to have the ability to adjust and underpin the research to derive a possible theory from the data, particularly, when there is no appropriate method and theory to support the study of the phenomenon, and especially as the research objective is to compare two universities (AU and TU). The use of constant comparisons

together with the theoretical sampling, constitutes the core of the qualitative analysis in the grounded theory (Boeije, 2002). In this way the grounded theory approach is suitable for conducting this comparative research study.

3.14 The Processes of Using Grounded Theory

To achieve the research objectives, the study employed grounded theory as the methodology for analysis of data through focus groups and personal interviews. The grounded theory processes are described below (see Appendix D for a visual representation).

3.14.1 Open Coding Phase

Open coding is considered to be the most important part in qualitative research. It is the crucial method of analysis from the initial data. Open coding is the process of looking at a process on the basis of line by line and phrase by phrase or even the whole paragraph analysis in an attempt to understand what the data means. The process of open coding is to understand the data by maintaining an open mind and brainstorming to perceive the emerging category or concept (Pace, 2003). In the open coding phase, this research applied Strauss and Corbin's (1998) analytical tool in the following way:

- The use of questioning: by asking questions about the case that will allow the findings to become evident; questions that can be used about the research study. For instance, what is the impact? why is it the impact? how did the impact happen? and so on. These questions are useful when the analysis needs to find a way to start and proceed to the next step.
- Analyse a word, or sentence or phrase: This process enables the researcher to concentrate on the question and highlight the results or evidence of the findings. Sometimes, it may be difficult to understand and interpret by using just a single word or even a sentence. In this way, the research may need more than one or more sentences to ascertain meaning and identify what the research question is looking for.
- Making the further comparison: In this process, each incident is compared to other incidents for similarities and differences and is grouped or placed in the

category. The second comparison involves comparing the categories to elicit the possible properties and dimensions of the concepts.

3.14.2 Axial Coding Phase

Axial coding is the process of finding and relating categories to their subcategories (Charmaz, 2006), to form more precise and complete explanations about phenomena (Goede and de Villiers, 2003). It is the second stage where the researcher begins to explore the relationship between categories, making connections between them (Strauss and Corbin, 1998). "The purpose of axial coding is to begin the process of reassembling data that was fractured during open coding" (Strauss and Corbin, 1998). Strauss and Corbin (1998) cited by Gibbs (2002) suggest a paradigm model for the axial coding phase in which "the researcher identifies six types of categories or nodes" (p. 167) as follows: causal conditions (the set of events or happenings that influence a phenomenon), phenomenon (the event, and the central idea of what is happening), the context (the extent or location of the events), intervening condition (element that facilitates or constrains) the strategies within the contexts and events), action/interaction (the method to manage, and respond to a phenomenon), and consequences (the outcome of the response action or interaction) (Strauss and Corbin, 1998).

Gibbs (2002) considers that "casual conditions produce the phenomenon which in turn causes the strategies in the contexts by intervening conditions and produces actions and interactions that result in consequences" (p. 171). In addition, the research looks at the conditional/consequential matrix which represents the interplay between macro and micro conditions (structure) and their relationship to actions/interactions (process) (Strauss and Corbin, 1990). Then, the explanation or story is presented in the form of an explanatory matrix and is depicted in Figure 13 (Goulding, 2002). According to the explanatory matrix, Baszanger (1998, p. 370) cited in Goulding, (2002, p. 83) describes that:

> *For each event or occurrence identified, the researcher asks four questions: What are the conditions of the action, the interactions between the actors, their strategies and tactics, and the consequences of the action? What we are dealing with here is a strategy for conscious recording through which the researcher's own experience is transformed.*

These conditions, contexts, strategies and outcomes tend to be clustered together and the connections may be hierarchical or ungraded, linear or recursive (Spiggle, 1994, Goulding, 2002). This allows the researcher to reconstruct the original data in such a way that its broader context becomes apparent (Strauss and Corbin, 1998).

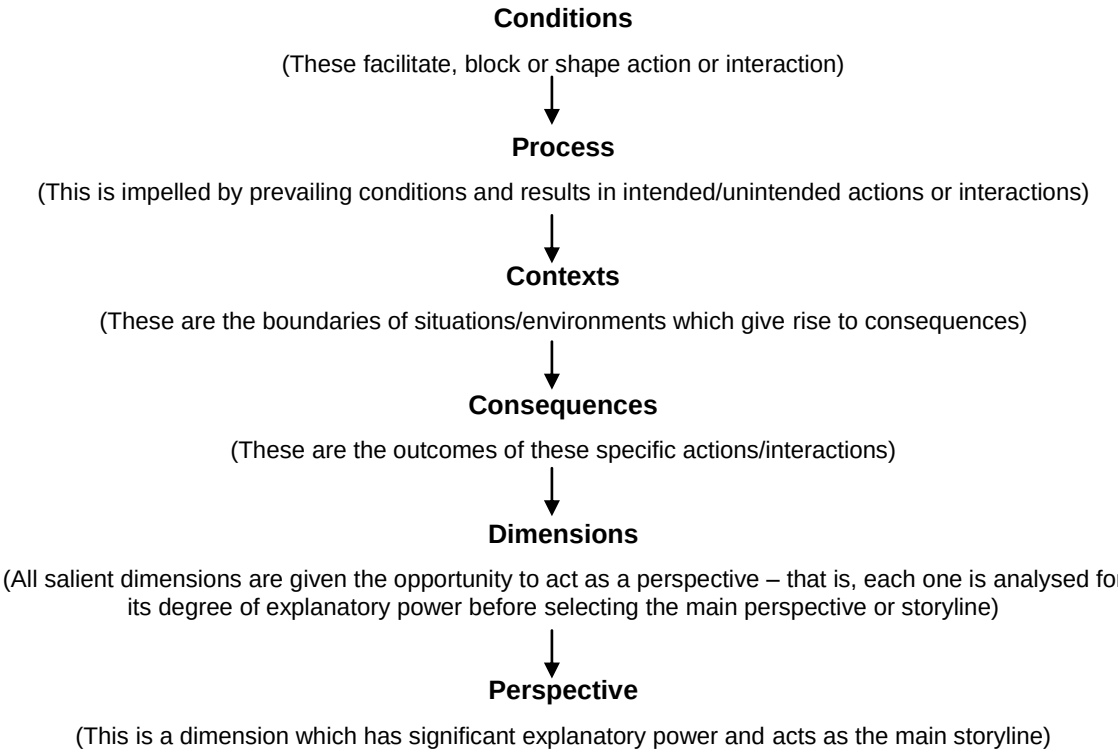

Figure 13 The Explanatory Matrix - *Kools, McCarthy, Durham and Robrecht (1996); Goulding (2002)*

3.14.3 Selective Coding Phase

According to Pace (2003), selective coding is the process of delimiting coding to only those concepts that relate to a 'core explanatory category'. Strauss and Corbin (1998) define selective coding as "the process of integrating and refining the theories" (pp.143, 161). This involves integrating the categories in the axial coding model (Mills, Bonner and Francis, 2008). However, this does not occur until the major categories are finally integrated to form a larger theoretical scheme where the research findings take the form of theory (Hunter et al., 2005). "In integration, categories are organised around a central explanatory concept" (Strauss and Corbin, 1998). Furthermore, Gibbs (2002) explains that **"**selective coding is where the 'core category' or central category that ties all other categories in the theory

together into a story" (p. 167). Selective coding begins with the selection of one of these categories as the central phenomenon (Strauss and Corbin, 1998). "Once a commitment is made to a central idea, major categories are related to it through explanatory statements of relationships" (Strauss and Corbin, 1998).

3.15 The Core Category

This step is to decide a central category that represents the main theme of the research. This occurs during the process of selective coding (Mills et al., 2008). The core concept consists of all the products of analysis condensed into a few words that seem to explain what "this research is all about" (Strauss and Corbin, 1998). In this phase, the researchers can focus on their questions to identify the main concept. For example, the research objective (phenomenon) and the research findings are accounted for and applied to the eventual development of the central categories (Mills et al., 2008). According to Strauss and Corbin (1998) "the central category has analytic power and the ability to pull all the other categories together to form an explanatory whole" (p. 146). It encapsulates the substance of a pattern of behaviour seen in the data (Schreiber, 2001). Moreover, "a central category should be able to account for considerable variation within the categories" (Strauss and Corbin, 1998). In many cases the core category may be difficult to identify or exist with more than one. In this way, Strauss and Corbin (1998) suggest "to select one of the ideas as the central category and then to relate the other category (or categories) to that central idea" (p. 147). However, Strauss and Corbin (1998, p. 147) propose a list of criteria for choosing a central category that a grounded theory researcher can apply:

- The category must be central and relate to all other major categories;
- The category appears frequently in the data or almost all cases;
- The explanation that evolves by relating the categories is logical and consistent without forcing of data;
- The name or phrase used to describe the central category should be sufficiently abstract that it can be used to do research in other substantive areas, leading to the development of the more general theory;
- As the concept is refined analytically through integration with other concepts, the theory grows in-depth and explanatory power;

- The concept can explain the variation as well as the main points made by the data. One also should be able to explain contradictory or alternative cases in terms of that central data.

Because the core category is central to the emerging theory, the researcher must be diligent in searching for the core variable throughout coding, always remaining open to the messages contained within the data (Schreiber, 2001). In the research, the core category emerged as the research had identified the relationships which connected to the explicating story.

3.16 Levels of Theory Building

Strauss and Corbin (1994) define "Theory is a set of relationships that offer a plausible explanation of the phenomenon under study" (Goulding, 2002). Glaser and Strauss (1967) cited in Goulding (2002) differentiate two major types of theory in terms of substantive theory and formal theory. Thus, Goulding (2002, pp. 45, 46) explained that:

> *Substantive theory is developed from work in a specific area, such as a particular type of organisation. It does not attempt to explain outside of the immediate field of study. The theory should remain parsimonious and should not try to generalise with explanations of situations for which there are no data to support.*

Although a theory at such a conceptual level, however, may have important general implications and relevance, and become almost automatically a springboard or stepping stone to the development of a grounded formal theory (Glaser, Strauss and Strutzel, 1968, Goulding, 2002). Goulding (2002, p. 46) concluded that:

> *A formal theory has explanatory power across a range of situations. The theory is usually the end product of longitudinal research, normally on the part of a team of researchers engaged in the collection of data across a range of situations and locations.*

In many studies, owing to the time, expense, and high levels of abstraction, many researchers tend to avoid constructing formal theory, preferring to remain at the substantive level (Goulding, 2002). In this way, the theory building in this research can be described as the substantive theory that explains the situations (phenomena) of the case studies. As a result,

the substantive theory in this research derives from the cases which may or may not be generalisable. However, the theory could be used as the guideline or framework to support and contribute to future IS usage research.

3.17 Analysis Tools

In this qualitative research, NVivo is employed to organise the analysis of data in the grounded theory approach (see Appendices E & F). NVivo is an example of computer-assisted qualitative data analysis software (CAQDAS), which provides assistance in structuring ideas from large data sets (Gibbs, 2002, Ozkan, 2004). NVivo provides a range of tools for handling rich data records and information about them for browsing and enriching text, coding it visually or in categories, annotating and gaining accessed data records accurately and swiftly (Gibbs, 2002). NVivo can also handle and organise the concepts and themes as there are always many concepts which usually emerge from the data. In the beginning, the process open_codes the meaning and idea of the data and then highlights that context to create what NVivo calls the item or node (see Appendix E). When using packages such as NVivo, each instance of a particular pattern can be collected under one node in a model and kept entirely cross-referenced (Partington, 2002). The idea can be drawn in the length of sentence, paragraph, or short phrase which depends on the meaning of the selection.

One useful aspect of NVivo is its ability with queries to compare multiple items in a specific context. This is known as a 'matrix coding query' because matrices are made of nodes that code data (Richards, 1999). The definition of a matrix is a rectangular arrangement of elements into rows and columns where each cell in the matrix is filled with a meaningful idea (Thinking Tools, 2003-2010). Matrix coding allows the researcher to investigate the relationships which occur in the same passage. In fact, the matrix approach is a structured decision support technique to help users evaluate, select - or create - preferred options (Thinking Tools, 2003-2010). For instance, Matrix coding queries create tables to compare multiple pairs of items you specify, in ways that you specify (Richards, 2011). In the coding data (called note, or concept), "intersection search can be used to focus in on those passages" (Gibbs, 2002). Similar to any other query, a matrix coding query can be limited to a scope that the user specifies (Richards, 2011). This feature enables the grounded study with large

amounts of textual data to design queries, analyse the material, and verify the theory (Edhlund, 2007).

3.18 Memo-writing

Glaser and Strauss (1967, cited in Arunthari, 2005, p.34) recommend that "collecting memos on each category is necessary since the discussion in the memos will provide the content behind the categories that become the major theme of the theory". Memo-writing is considered a useful method in a qualitative study. During the analysis phase, a researcher usually spends significant time creating the categories and concepts. Meanwhile, a lack of logic and coherence quickly manifests itself when the analyst is forced to put his or her ideas down on paper (McGhee et al., 2007). In grounded theory analysis, researchers use memos to elaborate processes defined in their focused codes (Richards, 2006). Memo-writing helps make researchers aware of their own potential effects on the data (Strauss and Corbin, 1998). Therefore, a memo's purpose is to capture or document the researcher's fleeting ideas at the moment they occur (Charmaz, 2003). "By writing memos continuously throughout the research process, the researcher explores, explicates, and theorises the emergent patterns" (Pace, 2003). As soon as the open coding starts, memo-writing should begin simultaneously. This technique also helps researchers to remind themselves and keep track of the study. Goulding (2002, p.65), states that "each memo should be introduced by a title or a caption, which is usually a category or a concept". These memos become a useful support for the researcher when it is time to develop the concept and theme, as the researcher can cross-reference categories or evaluate his or her analytical process (Lempert, 2007). "In short memo-writing provides a space to become actively engaged in the materials, to develop the ideas, and to fine-tune the subsequent data-gathering" (Charmaz, 2006). In this research, NVivo provides a useful function for placing and organising the memos (see Appendix F).

3.19 Research Validation

An important aspect of grounded theory, often misinterpreted, is to suggest that qualitative research never 'validates' theory (Aalst, Dumas, Hofstede, Russell, Verbeek and Wohed, 2005). Since the grounded theory method does not test or verify any preconceived hypothesis, researchers in grounded theory use research questions to verify the phenomenon (Strauss and

Corbin, 1998). For instance, this research study is based on the assumption that the grounded theory approach serves as a guideline to reveal a rich and deep understanding of users' experiences. However, this is not entirely the case because some qualitative studies do and some do not, but even those that do validate theory do not do so in the sense of testing as in quantitative research (LaRossa, 2005). Regardless of the form the research takes or the ends to which it is directed (Hunter et al., 2005), any research needs to be valid. In simple terms, validity addresses the question of how well the social reality being measured through research matches the constructs researchers use to understand it (Mansourian, 2006). Validity involves two concepts simultaneously: internal validity and external validity (Hunter et al., 2005). These are described in more detail below:

1. *Internal Validity:* In qualitative research, Neuman and Kreuger (2003) defines validity as 'truthful'. It refers to the bridge between a construct and the data (Neuman and Kreuger, 2003). In order to enhance the internal validity of the data, grounded theory includes open coding in the development of concepts, categories and properties, axial coding in developing connections between categories and sub-categories, and finally selective coding in integrating categories to build the theoretical framework. Using multiple sources of the unit of analysis also provides the internal validity as the theories are developed from data collection and analysis to test those theories (Tellis, 1997a). Becoming more specific, "internal validity is the extent to which results can be interpreted accurately" (Casady, 2005), though the results or outcomes will evolve from the theoretical framework and fit into the research questions.
2. *External Validity:* The concept of external validity is the ability to generalise findings from a specific setting and a small group to a broad range of settings and people (Daengbuppha, Hemmington and Wilkes, 2006). Beck (1993) contends that it refers to the extent to which results for a study can be generalised. In many cases, a study may have good internal validity but its value is limited if the findings only apply to the people in that particular investigation (Tellis, 1997a). The question is whether the results are more likely to apply more widely or not (Wiersma, 1995). With grounded theory the researcher must work in the actual environments in which the actions take place, in natural situations, in order to analytically relate informants' perspectives to the environments through which they emerge (Baszanger, 1998, Goulding, 2002). It

> is practically impossible to attain 'perfect' internal and external validity in a study, and attempts in research design to enhance internal validity may decrease external validity, or vice versa . However, using multiple case studies can create replication logic for establishing external validity (Tellis, 1997c), as similar results are evidence of convergent validity and have higher external validity than a single case (Voss, Tsikriktsis and Frohlich, 2002).

These are the methods of validation uses in this research. These methods are described as follows:

3.19.1 Triangulation

Triangulation is part of the data collection method that cuts across two or more techniques or resources (Mays and Pope, 2000). Denzin (1989), cited in Flick (1992), points out that: "Triangulation can take many forms, but its basic feature will be the combination of two or more different research strategies in the study of the same empirical units". By observing something from different angles or viewpoints, triangulation is also employed by quantitative and qualitative social researchers (Zaharias, Poulymenakou and Ramfos, 2001). As part of a research project, triangulation is either used in conjunction with multiple data sources or multiple data collection procedures. "It is a search for convergence of the information on a common finding or concept" (Wiersma, 1995). Wiersma (1995, p. 265) states that:

> *Triangulation of theory occurs when a researcher uses multiple theoretical perspectives in the planning stages of research, or when interpreting the data, combining qualitative data with different techniques for collecting data as the combination of methods is a beginning step toward triangulation theory.*

According to Golasfshani (2003), "triangulation is another step taken by researchers to involve several investigators or peer researchers' interpretation of the data". Moreover, "qualitative researchers make use of external referees such as other fieldworkers, academics and the informants themselves, in order to check their interpretation's accuracy" (Goulding, 2002).

As previously mentioned, this thesis employed a qualitative approach with focus groups and interviews, followed by observations. In this way, called 'data triangulation' that involves

using different sources of information in order to increase the validity of a study (Guion, Diehl and McDonald, 2011). Moreover, in order to achieve validity, this research also uses investigator triangulation and considers the ideas and explanations generated by additional researchers studying the research participants (Johnson, (1997) cited in Golasfshani, (2003)). For instance, the analytical processes were intensively discussed and obtained through the research supervisors who experienced and understood grounded theory as well as the qualitative study. As the result, this process of 'member checking' is well documented in the literature as a prime strategy to validate findings (Goulding, 2002).

3.19.2 Theoretical Sampling and Constant Comparison

Theoretical sampling is sampling on the basis of concepts that have proven theoretical relevance to the evolving theory (De Vaus, 2001). Theoretical sampling means that the research is using the additional sampling such as incidents, events, and populations to compare and support the arguments which further support the validity of the study. "In theoretical sampling the researcher selects new cases to study according to their potential for helping to expand on or refine the concepts and theory that have already been developed" (Taylor and Bogdan, 1998). Therefore, theoretical sampling is the process of collecting data for comparative analysis (Hage, 2007), and it is especially intended to facilitate the generation of the theory (Conrad, 1978).

According to the comparative objective of this research, the researcher has compared two cases or phenomena to find any differences or similarities between the categories. The comparisons also help to review the research findings. The aim of sampling here is to uncover as many potentially relevant categories as possible, along with their properties and dimensions (Strauss and Corbin, 1990). Based on the concept of making comparisons, the purpose of this is to go to places, people or events that will maximise opportunities to discover variations among concepts (Taylor and Bogdan, 1998). Using multiple cases also creates more robust theory development (Eisenhardt and Graebner, 2007). It maximises the "opportunities to compare events, incidents, or happenings and for comparing the finding of concepts along with their properties" (Strauss and Corbin, 1998). Rennie (1998) cited in Goulding (2002, p44) "strongly argued that grounded theory is also validational owing to the symbiosis of induction and abduction during constant comparison of data". The validation

often comes from research in empirical contexts that bear some similarity, but which differ in some distinct way or ways, and that enables the researcher to make comparisons between settings (Gibson and Brown, 2009). Strauss and Corbin (1998) found that validation is also built into each step of the analysis and sampling. Analysts are constantly comparing the products of their analyses against actual data, making modifications or additions as necessary based on these comparisons and then further validating the modifications and additions against incoming data. In this sense, researchers are constantly validating or negating their interpretations (Voss et al., 2002).

3.19.3 Enfolding Literature

According to Gibson and Brown (2009) state that "published literature can also be useful for helping researchers to validate their findings and theories". Elsewhere, it has been suggested that "a qualitative study uses the literature sparingly in the beginning of the plan in order to convey an inductive design" (Creswell, 2003). In theory development research, it is important to review the emergent theory against the existing literature (Voss et al., 2002). Gibson and Brown (2009, p. 34) state that:

> *This engagement with literature and the systematic recording of what has been studied, where it was published and its relevance for the development of the researcher's own ideas enables a researcher to demonstrate a good knowledge of relevant research and other works.*

The researcher also checks indirectly through the use of similar or related literature that helps provide a comparative picture (Borman and Preissle-Goez, 1986, Goulding, 2002). Gibson and Brown (2009) identify five potential uses of literature in research that extend across the life-course of the project as follows:

- To stimulate theoretical sensitivity (e.g. to generate concepts that can be brought to the empirical setting from the literature);
- As secondary sources of data;
- To compare alternative analysis;
- To direct theoretical sampling;
- To validate or compare theory or empirical claims in relation to what has already been said in the published literature.

This involves asking what it is similar to, what does it contradict, and why (Eisenhardt, 1989). It is also important to address literature that conflicts with the findings (Cresswell, 1994), as these conflicting findings suggest the evidence and reasons for the underlying outcomes (Eisenhardt, 1989). However, "literature discussing similar findings is important as well because it ties together underlying similarities in phenomena normally not associated with each other" (Eisenhardt, 1989). In fact, "the overall effective enfolding of literature increases both the quality and the validity of the findings" (Voss et al., 2002). In reference to studies on grounded theory research, Pace (2003) explains that:

> *References to relevant literature are made throughout the research to demonstrate how this theory compares with the findings of other researchers. This is a common practice in grounded theory studies. Researchers developing grounded theory generally avoid reviewing the literature at the outset of the study in an effort to stay open to the concepts and relationships that will emerge from the data. Once the emerging theory is sufficiently developed and close to completion, the researcher reviews the literature in the field with the aim of relating it to his or her work.*

Therefore, the researcher should "keep in mind the need to place literature at the beginning to 'frame' the problem, placing it in a separate section, and using it at the end of study to compare and contrast with the findings of the study" (Creswell, 2003). Specifically, relevant studies (literature) have been employed in this research for the purposes of comparing, referencing (additional data sources), and justification.

3.20 Summary

This chapter explains the research methodology employed in this research. It discusses the research design along with the justification of the qualitative approach. By using grounded theory as the analysis method, this chapter presents the information about the data collection and identifies the rationale for selecting the research approach. This is followed by a brief description of the grounded theory process that is used to investigate the research objective. Certain user groups and institutions have been chosen for undertaking a comparative case study. To make the comparative method work, qualitative data that is rich in character is sought from a variety of sources. This approach will be explained further in Chapters 4 and 5,

which detail the data analysis process and present the findings that emerged from the analysis of the data.

4 Research Findings

This chapter presents the empirical findings of the study which emerged from the open coding and constant comparison phases. In the analysis process, the researcher employed the analysis software called 'NVivo' for organising and managing the coding data. The categories are the result of data analysis and synthesis through a qualitative approach which employs 'Grounded Theory' as the research method. From the analysis of focus groups and interviews, the findings were classified into the system usage framework (system, user, task and organisation) and presented in tandem with specific users (administrative staff, students, academic staff, and IS/IT managers). Consequently, the data are mapped through repeated comparison of the data (Burton-Jones, 2005). In this chapter, the analyses of interviews and observations are also presented to support and verify the categories developed in this study. Although the researcher intentionally selects and reports the users' responses that are relevant to the concept, in some concepts the data from some of the users may not be presented. For instance, all students (Local and International) in AU did not mention the accessibility concept because they could access to the system without problem.

As the researcher intends to capture how the informants actually use the systems, the combinations of direct and indirect observations were employed as suitable methods for the context of this study. For example, during the period of student registrations and enrolments, the researcher could observe and obtain information from students who interacted with the systems. Also, during the observation with staff members, the participants were asked to explain how they interacted with the systems. This observation was included with verbal explanations about their system usage. Specially, the researcher captured the participants' feelings that were expressed while using the SAMS.

The chapter is structured so as to firstly provide the context of SAMS usage by all of the 4 user groups and to detail how that differs between the two case studies. The chapter then provides the findings in a structure that has been built on the processes described in section 3.14 The Processes of Using Grounded Theory and section 3.15 The Core Category. That is, the core

categories are presented in turn and for each category, its sub-categories are detailed within the structure. The primary data focussed on in the presentation of results is that generated from the focus groups and initial data. In a number of sections, this analysis is supplemented by data generated by the second set of data collection as described in chapter 3, which are the individual interviews and the observations that were performed. This data is presented under the heading of secondary data, to indicate that it was provided as follow-up to primary data collection method.

4.1 Systems Usage and the Users in AU and TU

As indicated in Section 3.11, university staff and students use SAMS as part of their daily tasks. In this section, Table 2 summarises the Frequency of SAMS Usage which refers to the number of times that users have employed the systems during a semester in AU and TU. This will illustrate the need for the SAMS by the user groups in the universities. This section expands on the high-level description of the user groups given in section 3.11 to provide detailed information about the key processes that each of the user groups uses in regards to SAMS. This provides the context within which the later findings can be interpreted, as SAMS are complex and multi-faceted information systems that need to be understood both in part and in whole.

4.1.1 Australian University

In AU, system usage refers to the users, systems, and task classifications as detailed in the sections below:

A. Administrative Staff

Administrative staff principally use SAMS to do various tasks such as: customer service, checking classrooms, checking students' enrolments, and other general or clerical duties. There are several SAMS applications that are available:

- Administrative Management System (AMS) and Internet Integrated Administrative Management System (IEAMS) are considered the core of SAMS. These systems are used every day.
- Employment Self-service System (ESS) is the system that administrative staff would use on average about once or twice per month.
- Result Processing On-line (RPO) is the system that administrative staff use for entering students' results. The system is occasionally used, probably once or twice at the end of each semester.
- Course Guide Edition System (CGS) is only used by some personnel who have the responsibility for checking and approving a course or program. The course guide system is also required to be used about once or twice each semester.
- Document Tracking System (DTS) is used only by administrative staff in order to find and search for the students' forms that have been used, or are being processed. However, the number of uses varies depending on how critical is the information that needs to be perused.
- Student Timetabling System (STS) is used by administrative staff to monitor students' enrolment, class and manage their records. Therefore, the system is generally accessed about 3–4 times each semester and depending on requirements.
- Administrative staff uses Enrolment On-Line (EOL) for supporting students in case of first year enrolling.

B. Academic Staff

Academics are regular users of SAMS but it is not their primary concern. They use it as part of their duties such as: checking the student list, checking the classroom, preparing information and materials for students. Academic staff also receives support from administrators if they request such information, e.g. the student 'class list'. Academic staff generally access SAMS for the following reasons:

- Administrative Management System (AMS) and most academic staff currently use Internet Integrated Administrative Management System (IEAMS) in accord with the university's security policy, but in reality only once or twice a semester.

- Employment Self-Service System (ESS) is the system that academic staff would use about once or twice a month. Usually, they use the system to check for their personal information such as income and payment.
- Result Processing On-line (RPO) is the system that academic staff use for entering students' results about once or twice each semester.
- Course Guide Edition System (CGS) is necessary because lecturers, tutors, etc., check and provide the course information and details concerning programs and subjects or courses. Academic staff would access it approximately once or twice before each semester begins.
- Student Timetabling System (STS) is used by academic staff to check students' enrolment, class and manage their records. In each semester, the system is generally accessed about 2–3 times and depending on requirements.

C. Student

Students are considered sporadic users who have a limited interaction with the SAM system. However, they may use it in terms of accessing the library system (such as the catalogue), mail, learning system, and internet. These systems are comprised of:

- Enrolment on-line (EOL) for enrolling before each semester begins. The student is required to use the system for their enrolment which is usually once per semester. However, if they need to change subjects or programs, the student may do so as long they follow the procedures and policies of their schools.
- Student Timetabling System (STS) has been regularly used because it is important for students to check their classroom, subject and timetable. The student would most often use it at the beginning of each semester.

D. IS/IT Manager

Generally, the IT or IS manager is the technical user who is responsible for the day to day maintenance and updating of the systems. The IS manager generally best understands the system's objective, functionality and structure, and in fact how it all works. Therefore, they intensively use the SAM systems most notably AMS, IEAMS, ESS, RPO, EOL, STS, and

the course guide editing system. Helpdesk service such as Information Technology Service (ITS) and the student hub have been set up to provide support for the university's staff members and students. These services are included in the general office applications and systems such as the Document Tracking System, Learning Hub, Blackboard, Web CT, E-mail, etc.

4.1.2 Thai University

In TU, the people who use the SAMS are classified as administrative staff, academics, students, and the IS/IT manager.

A. Administrative Staff

Administrative staff use SAMS for administration and registration duties. They also use the system to perform the service function and support customers such as academics and students. Generally, administrative tasks include monitoring the classrooms, checking students' results, students' enrolments, graduation, reports and other clerical duties. They are therefore the heaviest users of the SAM system. In TU, SAMS comprises the following:

- Administrative Management System (AMS): considered the core of the SAM system in the university, and used every day.
- Student Enrolment Online (EOL): administrative staff use this a few times (4-6 time) at the beginning of each semester.
- Result Processing System (RPS): the system administrative staff use it for entering students' results. The system is occasionally used about 3–4 times at the end of each semester.
- Student & Academic Time-Tabling System (SATS) is only used by some administrative staff who are responsible for checking and approving the classroom or program. The system is also accessed once or twice each semester.
- Student Graduation System (SGS) is the system that administrative staff use for monitoring students' graduations and records. Administrative staff use the system for this purpose every semester.

B. Academic staff

Academic staff are users of the system but not as often or regularly as administrative staff. They are considered to be only occasional users.

- The AMS is considered to be the core of SAMS in the university. The system is required for administrative tasks but academic staff occasionally use it once or twice at the end of each semester.
- Results Processing System (RPS) is the system that academic staff use for entering student results. The system is occasionally used once or twice at the end of each semester.
- Student & Academic Time-Tabling System (SATS) is only used by some of the academic staff who are responsible for checking and approving the classroom or program. The system is used in this capacity once or twice each semester.

C. Student

Students use SAMS for checking their results, time-tabling and enrolment status. Like academic staff, students are considered to be occasional users of the software. Generally they use it as follows:

- Student Enrolment Online (EOL): students are required to use the system for their enrolment and usually once or twice per semester.
- Student & Academic Time-Tabling System (SATS): the system that students and academic staff use to check for enrolments, classes and for managing their records, such as finances. The system is generally accessed 3–4 times each semester.

D. IS/IT manager

In TU, the IS/IT manager is the most regular user given the tasks and responsibility required for monitoring and maintaining the system. These systems comprise the AMS, EOL, RPS, SATS, and SGS. However, the level of manager usage varies depending on the situation with the systems, i.e. how many modules it contains. AU and TU are very similar in this regard concerning how SAMS is used.

SAM System		Administrative Staff	Academic Staff	Student	IT/IS Manager
AU	AMS	e	v	-	v
	IEAMS	e	2m	-	v
	ESS	1m	1m	-	v
	RPO	1s	2s	-	v
	CGS	1m	2s	-	v
	DTS	3m	-	-	v
	EOL	2s	-	2s	v
	STS	e	2-3s	3-4s	v
TU	AMS	e	2s	-	v
	EOL	6s	-	1-2s	v
	RPS	4s	2s	-	v
	SATS	4s	2s	2-4s	v
	SGS	e	-	-	v

Table 2 The Frequency of SAMS Usage in AU and TU

(Note: m= per month, s= per semester, e= everyday, v= variable)

4.2 The Findings

This research, based on the system usage framework from Burton-Jones and Straub (2006), comprises the user, system, task, and usage. The researcher has identified the prominent categories that have emerged from the open coding phase. In this research, 'organisation' is a new element that has been found during the data analysis from the users' responses. The notion of organisation refers to a place where people work together for a particular purpose and objective such as business and government. In this research, 'university' refers to an organisation which consists of people such as staff members (administrative and academic) and students. They also use the systems to perform their tasks and activities. The context of system usage is categorised in the following terms:

1) User
    a) Accessibility
    b) Resources
    c) Training
    d) User Requirements

2) System
    a) Good System Quality
    b) Poor System Quality
    c) Functionality
    d) Usability
3) Task
    a) Mandatory System Usage
    b) Task Requirement
4) Organisation
    a) Organisational Policy
    b) System Implementation
5) Usage
    a) Adaptation
    b) Manual Workaround
    c) Workarounds

In the first analysis, the open coding developed a set of 105 broad items (concepts) (see Appendix G). Each of these items can be considered to be a category as defined in section 3.12 Grounded Theory: "A category stands for a phenomenon, that is, a problem, an issue, an event, or a happening that is defined as being significant to respondents (Schreiber, 2001).

The analysis has used the descriptive meaning emerging from the data. In this phase, "the theoretical framework must be structured so that the data can be easily integrated into it" (Jones, 2007). During the open coding process, memos were also created which helped the researcher to redefine the items and findings. Moreover, a 'constant comparison' method was applied in this stage. This way, these items were compared and classified in order to identify distinctions and similarities which may in fact overlap. The second analysis stage has applied the axial coding. This involved putting the coded data back together by grouping codes that were conceptually similar (Boudreau and Robey, 2005). This process also helped to cluster and select identical items into the appropriate category. Axial coding resulted in the reclassification of data into larger categories (Boudreau and Robey, 2005). This way, the resultant 15 concepts were reduced from comparing and contrasting the initial 105 items. These 15 concepts can be seen as properties of the 5 core theoretical

categories that have been derived from the data analysis. The idea of properties were discussed in section 3.12.

The processes of refining and developing the categories and concepts that make up the grounded theory developed in this thesis are described in detail in sections 3.12 and 3.14 and involve a lengthy and iterative process where the text associated with concept is closely examined and compared (i.e. the idea of constant comparison) and concepts may be either discarded, merged or remain, while new concepts may emerge from the process simultaneously. As some examples, the concept of usability which is part of the System category was built on a number of concepts generated in the open coding stage of the process. Some of the concepts that factored in to the final concept of usability were: 'Complicated to use', 'Difficult to use', 'Easy to use', 'Not user friendly', 'Useless', 'User interface design' and 'Too much information' amongst others. The open coding process is one where a multitude of ideas are generated, some of which may turn out to be useful to the thrust of the research while others may not or may be duplicates of other concepts. As can be seen in the example, just from the names a significant amount of duplication is evident and close examination of the text confirmed the close relationship between these concepts which the process of axial coding caused to result in their overall merging in the concept of Usability.

It is noted that the key perception of concepts from some user groups have not been reported because each user group used the systems differently according to their tasks and responsibilities and sometimes, a particular user group did not have a key perception for the concept. In this chapter, the findings are presented and summarised in the tabulations which explain the concepts from the data analysis. Subsequently, the findings of 15 concepts were classified into the system usage framework which is presented in the rest of the Chapter. For each concept, the concept is first defined, then the key perception for each user group is presented in a tabular form (if relevant to that user group). Then a short discussion of the concept follows with illustrative quotes from both of the case studies. Appendices J1 to J6 show breakdowns of the frequencies of comment by each user group in both case studies for each of the 15 concepts.

4.2.1 User Category

Internally, the user is one of the key components of the system usage. Users are people who interact with the system (Stair et al., 2009). In the university, staff and students are those who use the SAMS to perform relevant tasks and activities. The findings consist of four concepts which are involved in the user context:

A. Accessibility
B. Resources
C. Training
D. User Requirements

A. Accessibility

In the user context, accessibility refers to the process of securing or making the service open to a wider user population (Usable Net, 2004). In this concept, access refers to the user accessing a system which is authorised by the university. According to the summary table (Table 3 and 4), the comments indicate that users who required accessibility to the systems and functions, relied on constraints linked to their role and level of authority. Policy prevents users processing, changing and copying data in any unauthorised way. The limitation of system access has impacted on some users because they were unable to access information they needed to do their job. Consequently, the organisation's decision-making processes and policies affect the users and their tasks. This is followed by additional information about the concept that was generated in Phase 3 by the follow-up interviews and observations.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	Accessibility is related to the task and the position of user.
Administrative staff (AU)	Administrative users need the system access more than the other users because of their tasks. The system constrains the administrative users.
IS manager (AU)	Accessibility is important and needed for the task.

Table 3 Participants' key perception on the issue of accessibility at AU

In AU, an academic staff member stated that accessibility for the user would relate to, and depend on, the task and user's position. In schools, users received permission to access and use the systems that were authorised by the university. One academic staff member explained the access that he had here:

Academic staff (AU) *Well, in my last job I had the access to this information because I was a program coordinator.*

Some people use AMS, but I only use IEAMS. I don't need to as I am not adding data into the system.

The comment from administrative staff in AU explained that most academic staff did not have right of access to the AMS. The university also limited the academic users who did have access, to use some of the AMS' functions and information. Therefore, academic staff were unable to obtain specific information that they required from the system. They needed to ask for support from the administrative staff who do have that access.

Administrative staff (AU) *For example, our administrative staff have access to the system, but academics do not have access to the most updated information in the system.*

Administrative staff *I use IEAMS because I do not have access to AMS.*

In AU, the IS manager explained that she needed to have access to the SAMS because she was responsible for system support. According to her administrative role, she also needs to access student information. The findings from staff in AU demonstrated the importance of SAMS access.

IS manager (AU) *In student administration, we all got access to the systems. We need to access a lot of data.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	Accessibility is dependent on position and task of the user.
Administrative staff (TU)	Accessibility is controlled by the university.
International student (TU)	Users are unable to access the system due to system problems.
Local student (TU)	Users cannot access the system because of poor system quality.
IT manager (TU)	Accessibility is dependent on the position and task of the user.

Table 4 Participants' key perception on the issue of accessibility at TU

In TU, an academic staff member reported that they were unable to access the system when they were not on-site because there was a restriction which applied to users. The user needs to apply for authorisation which also depends on the task and role of the user.

Academic staff (TU) *I would like to be able to work from home. Therefore, I need a high level of user rights regarding access to the feature.*

An administrative staff member explained that access was determined by the position as authorised by the university. Therefore, accessibility depends on the user's task and position.

Administrative staff (TU) *Also, this depends on the job duty, level of access or user right. If it is not his or her job, they cannot use that menu.*

The IS managers admitted that the tasks and positions of the user are considered important factors for system accessibility. This finding was echoed by the IS manager in AU.

IT/IS manager (TU) *As IT manager and the person who looks after the systems, I would say it is "need to use". However,*

I also have the authorisation to access any level of the systems.

The following observation reports illustrate the issues discussed above:

An administrative member of staff picked up the phone and answered questions asked by a student concerning her enrolment in a subject. She opened the EOL system to check how many subjects that student had finished and how many needed to enrol in. Staff stated that she could only see the student information from the system but the system would not allow her to change and export the information as she is a new staff member. She explained that if any student needs to enrol in a subject, he or she must enrol by using a paper-based application. With these forms, administrative staff must use the system for processing enrolments and records. However, she (a new administrative staff member) cannot do it by herself as she does not have direct access to the system. This task must be only processed by another administration officer who does have access.

B. Resources

Resources are defined as the available data, technology, people, and processes within an organisation to be used to perform business processes and tasks (Pearlson and Saunders, 2006). Comments from the users indicated that there was not enough support in the form of computer hardware, training, and internet services being provided. Also, the helpdesk service was often unavailable when the system failed. Users complained that they needed to either wait until the system returned to normal or tried to work around it by themselves. This was especially so when they needed to use the system to process results and transfer data to the registrar and administration services.

In this context, information is also considered to be an important resource for staff and students. The finding of this concept shows that computer hardware and facilities (resources) constitute an important factor because users need support when they are using the systems (see Table 5). For this reason, therefore, the organisation is the key issue of the concept which determines the support in the form of resources for systems usage.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	Information services are considered to be resources for the academic users.
Administrative staff (AU)	Information is required as resources for the administrative users to process the tasks.
International student (AU)	The system does not provide the information to support the users.
Local student (AU)	There is inadequate support staff to provide information for the users.

Table 5 Participants' key perception on the importance of Resources at AU

In AU, information is defined as an important resource which is used throughout its schools and administration sections. Information is considered to be available in the form of assets and capabilities for the users. Most academic users perceive that information is important for them to process their tasks. One comment from an academic staff member referred to SAMS lacking the information to support users when decisions had to be made:

Academic staff (AU*)* *Well, I think the SAMS in particular probably need more information. Now, one other thing that happens if you are looking for examples, are health and medical records; all sorts of people contribute the records into that.*

The comment from an administrative staff member suggested that a user required the information which was needed to process reports in order to service other staff members. Users were aware that resources must be available to support users in order for them to perform their tasks more effectively.

Administrative staff (AU) *Being able to do that will help us because sometimes we have a request from the academics of a school saying that we need to know for a report for the college; we need to know what is the percentage rate of success in certain programs from this year to that year.*

In AU, international students found that the system lacked the necessary information to support and service them. The comment from an international student was similar to the academic staff and administrative staff members.

International student (AU) — *For our website, it should be like the student time-table. So any time when I go to our website, I need the calendar to show me about the day, time, and room which I go to for class. There is no information there.*

In AU, a local student claimed that there was inadequate user support in terms of providing information and services. Many students perceived that supporting information is much-needed and important to them, which is similar to what the other user groups said.

Local student (AU) — *Yes, there were the staff members, but because that just about 30 of them in the room. There was no one-on-one. They didn't have time to go around.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	Computer hardware and support people are considered the important resources and facilities for the users.
Administrative staff (TU)	The lack of a support team to provide technical service to users.

Table 6 Participants' key perception on the importance of Resources at TU

In TU, academic staff expressed their perceptions about the lack of resources such as computers and networked facilities. Administrative staff also reported about the lack of support people in technical area. In Table 6, both of staff members stated that helpdesk support was very inadequate. Two academic staff personnel explained that:

Academic user (TU) *Sometimes, when the system crashed, they don't always have any support staff to provide users with support.*

Four people in my room are sharing one computer together, and now it is not working. Well, we have to find a computer from another room to use. Also, time is limited too. We have to queue to use it.

In TU, there is not enough technical support provided to the administrative users. An administrative staff member reported that these problems have created problems for many users because they were unable to use the system and often needed to wait for vendor support. He explained that:

Administrative staff (TU) *We (our university) do not have a team who can provide technical development support of the systems. So, we still use the vendor's support.*

The following comments illustrate the issues discussed above:

Academic staff and administrative staff found a lack of resources to support users' tasks. They found that there was not enough information to support the user in operating the systems.

Academic staff *Yes, I think some of the information that shows in the ESS is unclear in terms of working hours. It should be a bit clearer. In Blackboard, there should be a feature or function of interactive video to use where you can show the student what is the problem when working on computer programming or mathematic calculation or something. So, you can point, circle, talk or media interacting at the same time with the system.*

Administrative staff *Yes, I can but it is more complicated. This is just straight forward. But if I go to IEAMS, there are too many boxes. Sometimes I did not get all that information.*

C. Training

In the training context, academic users reported that they did not require training, as they perceived that the system was intuitive and easy to understand. However, the comments from administrative staff were very different. They mentioned that the systems were complicated and difficult to comprehend, meaning that more training is required. Moreover, international and local students also suggested that the system training should be easy to understand and lead to better convenience in using the system. One IS manager stated that there is no policy in providing system training. In this concept, organisation is the key factor which determines and decides the training if, when and what training is required.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	Training is not required as SAMS is easy to understand.
Administrative staff (AU)	Inadequate training is caused by the university policy.
International student (AU)	Students prefer SAMS training to be more interactive or through the use of video.
Local student (AU)	Training should be easier to understand.
IS manager (AU)	Training is no longer provided as the university policy.

Table 7 Participants' key perception on System Training at AU

The data in Table 7 address participants' views on system training in their university. In AU, one academic mentioned that training was unavailable, and academics were not required to attend SAMS training. However, the systems need to be easy to use and understand. Therefore, academic staff seemed not to be interested in attending system training. An academic stated:

Academic staff (AU) *No, they did not provide training for that. So, it needs to be intuitive, and you do not need any training, and it mustn't be complex to use.*

Administrative staff admitted that SAMS is mandated for mainly administrative tasks and processes. However, the university wanted to limit the previous system access for security reasons. Therefore, the university does not provide training to new users. Consequently, this policy impacts on the users because they are forced to find their own way to understand how the system functions. An administrative staff explained here:

Administrative staff (AU) *It is necessary for us to use that system, but because of the new policies, they discourage us from using this particular system. So, there is no training provided for us.*

The comment from international students was similar to local students in that they need system training. However, one international student suggested that using online training such as multi-media or videos would be more convenient, useful and easy to understand for them.

International student (AU) *I think for all of us, we don't like to read. However, we would like to have training. University should have online training like video clip or something like multi-media training.*

Local students also required training for the system to be more convenient and easy to understand. Due to the complexity of SAMS, students required more support and wanted to have training such as in the form of a comprehensive user guide.

Local student (AU) *So, maybe if the system can provide the guide or the step to go through the process of that. It would be lot better to know what you need to do as a step by step or procedure, in case if you cannot get help from the staff.*

The IS manager's (AU) comment reflected the change in the university's policies. Training is not available because of the new policy. However, the university has provided a helpdesk and the hub to support other university personnel and students. She explained that:

IS manager (AU) *There is a little bit of re-structure there over a year. Some people think they should be training. But it has not been specified in their responsibilities. And so that is why we did not give very much in training.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	Users are not confident with the training provided by administrative staff.
Administrative staff (TU)	Administrative staff also require technical training from the vendor.
IS manager (TU)	Training is the responsibility of administrative staff and IS manager.
International student (TU)	Users can understand how to use the system without the need for training.

Table 8 Participants' key perception on System Training at TU

The data presented in Table 8 address the participant members' views on their system training. For instance, the comment reported from one academic person at TU described how SAMS training is the responsibility of the university administration staff. However, from an academic staff member's perspective, most of the administrative staff are not competent enough, or lack knowledge about the system. For this reason, administrative staff may not be able to support other users. According to one academic staff member:

Academic staff (TU) *As there will be no more training available from the vendor, the administrative staff will have to train other staff by themselves. So, they do not fully understand how to use the system.*

In TU, administrative staff reported that they required specific training in order to provide support and maintain the SAM systems. This comment also agreed with the previous comment from academic users. An administrative staff member stated that:

Administrative staff (TU) *I have requested to the university that we need proper training from the vendor in technical areas such as reporting function and others. The training is important for us.*

International students commented on the lack of SAMS training in the university. One student said that he had to learn to use the system by himself.

International student (TU) *I think I am very much like him, as no one introduced us to use the system and the web. So, I had to learn how to use it by myself.*

The IS manager (TU) stated that he also had responsibility for SAMS training, because the vendor no longer provided any direct support or training to all users. Therefore, the training in TU would be conducted by the IS support team and administrative staff.

IS Manager (TU) *So, the vendor came to provide that training?*
Yes, but they only came and explained how to use the function to me, so I could understand and train the others.

Secondary data [1]

In the context of training, there were mixed responses from academic users, administrative users and students who depended on the systems, users and their tasks:

- Training is not required for some aspects of the system if a user understands the task process;
- Training is not required for some aspects of system if the user has had more practice and understands the process or task;

[1] Secondary data is referring to the second time of data collection, e.g. interview, observation (page. 57).

- Training is required because the system lacks usability. Also, users cannot receive staff support or advice.

Academic staff *For some of the system you don't need the training. It is really straight forward. But, I guess if you are not familiar with the process you might not understand why that is important.*

Administrative staff *No, I learnt by myself. I went from task to task. No, no manual has been given to me. We have been practising and use it every day.*

Student *Sometimes, I was looking for help, searching, and looking for information from the student enrolment guide. But there were not much help. The system was too difficult. I couldn't understand.*

Administrative staff

- User explained the need to find the important dates in student timetable;
- User explained to the student about the next part of the enrolment process, and what are the steps that student must do for printing a hard copy version of the document.

Student

- User was looking for help from support staff;
- User waited for support staff to explain how to find the password based on the information in the letter;
- User asked the question as to what he should do next. She kept reading a student enrolment guide. Then, she stopped and looked at other students. She raised her hand in order to get support staff's attention.

D. User Requirement

The data in Tables 9–10 summarise AU and TU users' comments on the issue of user requirements. Staff and students described the deficiency of user requirements and they perceived SAMS as lacking functionality, which is vital if tasks are going to be done. Here, the user requirement refers to feedback from the users. University automated systems

require efficiency in the following areas: accessibility, functionality, training, usability, and resources. For instance, administrative staff require training to support their use of SAMS. System and task are identified as the key issues which can determine and influence the user requirement.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	SAMS is not friendly to use. Users require the system usability to be improved.
Administrative staff (AU)	Users require fast access to the information.
International student (AU)	Students require support.
Local student (AU)	Students require system usability.
IS manager (AU)	Staff reported the need for functionality to support the users.

Table 9 Participants' key perception on User Requirement at AU

In AU, many academic staff found the system interfaces were complicated and confusing to use. An academic user reported that the SAMS were complicated and difficult because the system lacked usability. Also, the functionality was not very helpful when the user was trying to find information in the system. This academic staff member suggested:

Academic staff (AU) — *Somehow, the system should be simpler, more user-friendly and far more easy. By clicking a button that gets you everything and easy to allow you to load something. However, I can't see that available. It is not there in the systems.*

An administrative staff mentioned that the SAMS is too slow to access and in its response times when information is needed. The system was unable to respond to what he required. He said that:

Administrative staff (AU) — *The problem is that every school, every administrative officer would like to be able to get information quickly – at this stage it is very hard*

to do that. Sometimes, I couldn't access it. Sometimes, it was too slow.

The comment from international students explained that they require online support in a specific form to make up for the lack of training. For example, an international student suggested that the online training and user guide should be available from the website, as this would very convenient for users. He explained that:

International student (AU) — *There should be proper training. However, we don't have that. So, we should have something like "pdf" file or something that can show us how to do it.*

Local students (AU) remarked that the SAMS functionalities should be integrated into a single system or one application. A student reported that they want the system functionalities to be re-organised. This would make the system much more usable and convenient.

Local student (AU) — *I need the system to be more organised like a single program which contains all the functions. So, the functions will be easier to find and access.*

Similarly, the IS manager mentioned that the SAMS should include an immediate response or acknowledgement functionality for students when they have completed their enrolments.

IS Manager (AU) — *They really want something as the response. So, confirmation is very important for them. If they can find a proper screen reports that "you are now enrolled", I think they will be convinced to walk away and happy to say, that is good.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	User requires functionality when doing a task. Misfits in data and output have been found when implementing the system.
Administrative staff (TU)	User requires the system to provide self-service support.
International student (TU)	The system should provide support and service to users.
Local student (TU)	User requires more information and support from the system.
IS manager (TU)	User requires better functionality to perform tasks.

Table 10 Participants' key perception on User Requirement at TU

In TU, one academic staff member reported a problem in the design of the database system, in that some fields were missing and others did not match the data set which academic staff needed for entering important information and results. This academic staff explained that:

Academic staff (TU) *When we start to use the system, something that is required or we needed to have is not there. Fields that they created in the databases have not been designed to match the specific information such as mid-term, final and first semester.*

The comment from one administrative staff suggested that every administrative user required the systems to be self-service and easy to operate. This self-service ability would help them to reduce their administrative workload.

Administrative staff (TU) *I would like the self-service systems that allow students to manage their programs and activities themselves. So, this would be the benefit to us and our department in the way of reducing time and workload.*

An international student mentioned the issue of system constraint that restricted students from enrolling in more subjects. Students also suggested that the system should provide on-line support. An international student explained that:

International student (TU) — *If you want to register or enrol in more subjects, the system won't allow you to do that. Also, they should give us on-line support.*

In TU, a local student reportedly found similar issues to those of students and the IS manager in AU. She mentioned that the system lacked a specific function to provide the information to support students which is important for their enrolments. A local student noted:

Local student (TU) — *Also, with student enrolment, there should be a confirmation or notice that can acknowledge to students who may have no idea about the requirements or the procedures.*

The IS manager (TU) commented that the SAMS lacked the functionality to process credit subjects for students. He explained about the need for improving the system here.

IS Manager (TU) — *We do not have our credit and subject transfer system. So, that's why our administrative staff could not do it on time. Therefore, we need to have a system to help with this issue.*

This information provides additional comments and observations from SAMS users (administrative staff, academic staff, students) describing their requirements and activities. The academic user wants to know if the information is correct for students to use for their enrolments. The administrative user requires the functions that they need to use for certain tasks. The IS manager states that there is a plan for the new system to collect information from users.

Academic staff	*The reason that I go in and look at the student time-tabling system, is that I need to make sure that these details are correct before they go online for the students to enrol. How do you deal with the problem or something which is not right from the system?*
Administrative staff	*Yes, I have requested the access, but it needs to go through the report as to why the functionality needs to be provided and how often you need to use the functionality.*
IS/IT manager	*What is it going to look like in the future? So, we require having a new system for the upgrade. So, we have two years to actually start planning what we want it to look like. Because we don't want to just throw EOL into the student website. That is not useful. It must be better. Then we need to work through how to get absolutely everybody online.*

Administrative staff: A user explained that she needs the RPO (Result Processing Online) system for making reports available to academic staff and the school. She accesses the log-in screen and clicks on the tick-box to do this. She uses the SAMS for entering the results and helps some academic staff who did not have access so that they can enter students' results.

Student: When a student finished the enrolment, she waited for the support staff to make sure that she will receive the confirmation if she has successfully enrolled. Quite often, the students decide to leave the table to find support staff because they require help when using the SAMS.

4.2.2 Systems Category

System is defined as a set of elements or components that interact to accomplish goals (Stair et al., 2009). Generally, a system is important to the organisation as well as the individual so that productivity and outcomes are achieved or delivered. In the context of systems usage, a system is used as a tool to perform a certain task. Systems based on

computers are increasingly being used to create, store, and transfer information (Stair et al., 2009). Consequently, the task requires data and information which must be processed by the system. Thus the system comprises important factors that can determine and affect the state of the system usage.

Four concepts from the analysis of qualitative data sets have been generated by the open coding phase. The following set of systems context describes the importance of the system characteristics, condition, situation, and value of SAM systems at both AU and TU. These concepts are also presented from the analysis of users' viewpoints and presented as follows:

A. Good system quality
B. Poor system quality
C. Functionality
D. Usability

A. Good System Quality

Quality is a characteristic of a product or service that reflects how well it meets the needs of its consumers, in terms of being associated with product or service satisfaction (Nagel and Cilliers, 1993). In the university environment, staff and students commented on their positive experience where the system did provide support to them. Some users reported that the system is more efficient to use than a manual system. In this context, the quality of the systems is reflected in the system's capabilities, and the system's design and performance contribute to achieving its objective. Staff agreed that SAMS have good quality as it can provide benefits to users. However, most users found that the previous system had more and better features than the new system. Here, user requirements and system design are the key factors which can affect the system quality. In this research, the 'system quality' refers to the 'good outcomes' of the SAMS for the users. For example, the AMS can process a task faster and more efficiently than the IEAMS. The data presented in Table 11, 12 summarise the comments articulated on the subject of system quality at AU and TU.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	SAMS has good qualities and is useful to the user.
Administrative staff (AU)	AMS (old) is of better quality than IEAMS (new).
Local student (AU)	Improvement in system quality increases users' satisfaction.
IS manager (AU)	The system has provided responsiveness to users.

Table 11 Participants' key perception on System Quality at AU

In AU, an academic user stated that the SAMS operates according to her needs. The user was able to use the system to manage the information for the task. This was evidence that SAMS had the quality to satisfy the user.

Academic staff (AU) *The system is fine, and useful. I use ESS. It has provided good information and not only for the payment. It also keeps up-to-date.*

On some occasions, administration personnel found that the new SAMS was relatively slower than the previous system, because the new SAMS relied on the online access and network capacity. The previous system operated simply as the basis of the client server network and it had the advantage of speed and quality when compared to the current system.

Administrative staff (AU) *AMS relies only on the university network traffic. I find using AMS is much easier because you can navigate through it quicker.*

A local student (AU) commented about the new SAMS interface. He found the system is easier to understand because of the improvements to it. A student explained that:

Local student (AU) *I find it is relatively easy to use and straight forward, because at the main front page, I find it*

easy with all the links that I can use where I want to go.

The IS manager was asked about whether SAMS is able to support users. She commented that its quality led to greater accuracy and reliability for users.

IS manager (AU) *Yes, it's accurate at the time. The work that has been used and it has been done and support. So, they can do it. Yes, it does supply what we need.*

Thai University (TU)

Participants	Key perception
Administrative staff (TU)	SAMS has the advantage in term of processing data in comparison to the manual operation.
International student (TU)	SAMS is saving more time and reducing user workload.
Local student (TU)	SAMS is saving more time and reducing user workload.

Table 12 Participants' key perception on System Quality at TU

In TU, the administrative staff also asserted that the system was useful and more efficient in comparison to the manual process. An administrative staff officer expressed the opinion that SAMS helps her to find information quicker.

Administrative staff (TU) *Unlike using the system, you just key in the student ID and all will come up on screen. It is much faster.*

International students remarked that since the introduction of the system, they have found the enrolment process is much quicker than the manual application. Students, much like the administrative staff, were satisfied with the system as it could deliver the quality they required. One international student explained that:

International student (TU) *When I used the manual, I had to go through many processes, because the enrolment form must be signed by the head of school, the director of*

	the program and the lecturer of the subject. After that you need to present it to an administrative staff member. Then they will enroll you in. So, I prefer to use the system. It is quick and more accurate.

Local students also commented that the system helped them to reduce work processes. All of the students admitted that SAMS is more convenient to use than the manual system.

Local student (TU)	*However, using the enrolment online through the Internet saves me a lot of time. It is really useful and faster than manual registration. I can do that at home too.*

Secondary Data

This section provides some other comments and observations from SAMS users (administrative staff, academic staff, students) describing the system quality. In the follow-up, users described the systems as effective for their tasks.

The system can reduce the administrative workload;

- The system has effective functionality to search for information for users;
- The system has the ability to perform and find information for users.

Academic staff	*I like IEAMS. I just quickly log-on and get the information that I need. And it does save having to walk around to administration, or sending an email. Also, the same with timetabling – just get the list by myself without bothering someone else.*
Administrative staff	*Yes, it provides the function and is reasonably fast to use. All I do is use the function.*
Student	*So, I am able to see the information about the course, detail, and prerequisite and so on. So, they have a list of the courses which I can choose. This is quite good and useful.*

Administrative staff: A user commented that the system performs reasonably quickly. All she has to do is simply use the functions. For example, when she wants to create the students' enrolment reports, the user just selects the class, time, and the subjects to retrieve the student information.

Student: A student noted that the system is helpful because she can use and find the information. For example in regard to the course or subject, she can search for the relevant information online. The user is able to see the information about the course, details, and prerequisites and so on.

B. Poor System Quality

In this finding, poor system quality has emerged from the system constraints such as system design and development, project management, organisational support and organisational policy. For instance, many users were unable to use the system because SAMS was of poor quality design and development. As the result, they must use more than one system to complete a task. Therefore, the term of 'poor system quality' is about 'ineffective outcomes' of the SAMS for the users. Furthermore, the system was difficult and complex to use because it lacked usability. The participants' summarised comments suggest that accessibility, functionality, reliability, usability are the factors that impact most on system quality. Here, system and organisation are the key issues that relate to the concept of poor system quality. The data in Tables 13, 14 summarise AU and TU users' comments on the issue of Poor System Quality.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	Poor usability affects system quality.
Administrative staff (AU)	Poor system quality due to the constraint of system design.
International student (AU)	Poor system quality due to the system lacks of usability.
Local student (AU)	Poor system responsiveness and unreliability affects the system quality
IS manager (AU)	The lack of system functionality affects system quality.

Table 13 Participants' key perception on Poor System Quality at AU

The importance of system usability is a concern to many users. In AU, an academic staff member commented about the lack of system usability which made the system difficult to use and easy for mistakes to occur. He remarked:

Academic staff (AU) — *I mean the course editing took me a whole summer to finally approve and finish. You finish the task but it is always the hard way.*

An administrative member of staff reported about the constraints in SAMS. He said that the system could not provide instant updates of information and one had to wait. Therefore, the user must be aware of delays in the system processing. At AU, the ineffectiveness of SAMS has affected the system quality as well as usage. One administrative person explained that:

Administrative staff (AU) — *There is also the problem because of two systems. You could have looked up student information and one system always takes 24 hours to get the information from the other one, so you have to make sure that you look up the right system.*

An international student reported on the issues of system performance and user interface. The student commented that the confusion over the user interface created more frustration while she was trying to search for information. She acknowledged that the system had poor usability design.

International student (AU) — *Yes, it is very slow, and then the design. Because I have some basic understanding about how to design the colour they use on the website. It causes a lot of confusion to the audience, if they work for long hours on the web site.*

The comment from a local student highlighted a reported failure of the SAMS that created a problem for users, in that they were unable to use it for a significant period of time. A local student commented that the system should be more stable, reliable and available to

users. Online learning is particularly critical for students who live a long way from the university.

Local student (AU) — *The system is often clashing – the way they released EOL to us to use. I suppose that way they make sure it doesn't clash. It is kind of frustrating.*

The IS manager commented that the SAMS lacks functionality for checking the prerequisite subjects, because students may not qualify to enrol in a particular subject. The system constraint has created problems for schools and students. Also, the system could not support (acknowledge) students when selecting subjects. Therefore, these problems impacted on university administration and schools because they needed to process student's enrolments. The IS manager explained that:

IS Manager (AU) — *If the students don't change that, we put in the formal process or e-mail them about not to come in the program because the system does not do that. This is the problem.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	Unreliability and unavailability of the system compromise system quality.
Administrative staff (TU)	Poor system quality due to system design and development.
International student (TU)	Problems with the system's unavailability and inaccessibility which impact on users.
Local student (TU)	The system has no functionality to provide and support provision of information to users.
IS manager (TU)	The lack of system functionality impacts on the system quality

Table 14 Participants' key perception on Poor System Quality at TU

In TU, academic staff reported that SAMS often failed to operate and was unreliable. These users were frustrated with this because they were unable to process and transfer important

reports. The students were also affected because the system was unable to process their results. As one academic staff member explained:

Academic staff (TU) — *Sometimes, I did data entry at midnight on the due date. However, the systems hang so I could not go on. Then the systems freeze and lock. I could not use it anymore. That was really frustrating.*

Another administrative staff member explained that poor system quality was affected as when the university had fixed the problem of the systems. A new problem arose as it was related to the previous problem. He stated that:

Administrative staff (TU) — *I think it is still not good enough. However, that problem has affected other parts of the system as well. The software developer cannot fix the system completely.*

In TU, an international student reported problems such as system crash and inaccessibility occurring during busy periods. These problems have affected other users.

International student (TU) — *Sometimes in the registration period, I cannot see the web site. It reported that web site cannot be found. Also, sometimes my password is not working. I cannot log-in or access the website.*

One local student mentioned how the problem of system failure affected students, in that they could not enrol because their results were not available.

Local student (TU) — *The system often crashed or stopped working while I was using the system. If the system is still not finished processing the grades and the results in every subject, then the students cannot see their results. So, we cannot make any change or update our student profile.*

Problems with system functionalities at TU have been mentioned by the IS manager and these echoed what the IS manager at AU said. However, this problem created problems for most users and led to quality issues as well.

IS manager (TU) *The system is still unable support some of the features and the problem of cross-checking in subject and credits and subject duplicating. So, that affects the administrative staff because they need to check it one-by-one. So, students need to wait.*

Secondary Data

This section highlights other comments and observations from SAMS users (administrative staff, academic staff, students) describing the poor system quality. Both academic users and administrative users have found that SAMS is complicated and difficult to use. The system lacks a help function that users require in order to understand how to use the function.

Academic staff *It can be quite difficult to actually find out which one we got, and because of so many databases, which each of these journals were attached to. It is difficult. I don't know how much you know about which databases to use.*

Administrative staff *I also use SAP for staff information. I don't find the systems to be an exceptionally user-friendly system. To me it is quite complex. So, if I don't need to use it, I won't use it because I actually need a lot of time. When you are working in this environment, you don't have that time to waste on a system to get the information.*

An administrative officer typed in the student number to search for the student timetable. However, no information appeared on the screen. She had to repeat this process a few times to get the information. The response rate of the system processing was very slow. The user indicated that she was not satisfied with the process.

During the student enrolment session, one student read information from the user guide and checked her document against the enrolment page screen. However, she could not understand how to continue on and which procedure to use for the enrolment stage. She then walked out of the room and looked for the support staff. Here the user does not understand the information in the user guide or how it is presented on the screen. She was confused with the student information and the user interface.

C. Functionality

From the comments summarised in the Tables 15-16, the findings suggest that functionality is one of the most important factors affecting the system usage. Staff and students responded that the system lacked functionality to support users. Gaps appeared between aspects of functionality that were offered by the systems and the user requirements, leading to more problems. In this concept, system design and user requirements are considered to be the key issues of system functionality which can affect the quality of a system.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	Improvement in SAMS's functionality is needed so the users are supported.
Administrative staff (AU)	Users require better functionality to support their tasks.
International student (AU)	SAMS lacks functionality to support users.
Local student (AU)	The functionality of SAMS should be integrated into a single application.
IS Manager (AU)	SAMS is lacks functionality to support users.

Table 15 Participant's key perception on System Functionality at AU

An academic member of staff at AU commented on the function of SAMS (search engine), saying that it should be improved because it could not return the desired results due to ineffective functionality. This problem beset other users because they were unable to find the information they needed. The comment indicated the poor quality of SAMS functionality.

Academic staff (AU) *I think the priority of what needs to be improved is the organisation of the university website and the search engine that provided access to material*

on the university website needed serious review and update.

An administrative staff member stated that SAMS lacked the functionality to search for information. In school, administrative staff require information from the database for creating reports, and they need the functionality to access specific data. An administrative staff member explained this issue.

Administrative staff (AU) *But SAMS does not have that functionality. It only gives you a certain way to identify transit of data and looking across the system. We need to know for the report for the college.*

International students at AU commented that SAMS lacked functionality to provide required information for students. One student mentioned that they were unable to find the information they needed.

International student (AU) *For our website, it should be like the student time-table. So anytime when I go to our website, I need the calendar to show me the day, time, and room where I have the class. There is no information there.*

In AU, a local student also remarked on SAMS functionality. She stated that it would be useful for the students if these functions could be combined into a single system, so they could easily find and access those functions.

Local student (AU) *I would like the system to be more organised like a single program that contains all the functions to use.*

The IS manager also admitted that SAMS is still unable to provide important functionality to support most users.

IS manager (AU) *Currently, IEAMS is not enough improvement for other staff that can run a report as they want.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	The system designer must understand users' tasks in order to design a suitable functionality
Administrative staff (TU)	Poor system quality due to design and development, the problem of the vendor.
International student (TU)	The lack or unavailability of the functionality and its impact on usage quality.
Local student (TU)	Functionality should be carefully designed and customised to support users.
IS manager (TU)	SAMS has the functionality to provide and support users.

Table 16 Participants' key perception on System Functionality at TU

In TU, an academic staff discussed some of SAMS's functionalities where there was inappropriate overlap and should be re-designed. An academic member of staff also suggested that some of the menus and functions should be separated to reduce confusion at the user interface.

Academic staff (TU) *For me, I think some of functions should be used or combined into the same menu. But for some, the menu, it is needed to be a separate part of the function.*

One administrative staff member asserted that certain aspects of functionality were missing and these caused a serious problem for the school and other users. The problem was due to the ineffectiveness of the system implementation.

Administrative staff (TU) *We found that we wanted to have another function in the system which we will be using, but it is not there, so we need to hire the vendor to do it. The missing function should have been in the system from the beginning.*

The missing system functionality has been reported by an international student. The student mentioned that she needed to request support from the administrative office instead.

International student (TU) — *I would go to the university office by myself if I need more information. Also, our web site does not have the function which can support the task I need to do.*

Local students also reported that SAMS fails to provide the information to support enrolment. Most students were confused by the procedures which were unclear to them. They needed the functionality to check for their subject requirements and prerequisites.

Local student (TU) — *Also, with student enrolment, there should be a confirmation or notice that acknowledges students who may have no requirement or prerequisite to enrol.*

However, the IS manager responded with a positive comment about the system. He claimed that SAMS had more functionality that makes service and support to the users possible. He also stated that SAMS is well designed.

IS Manager (TU) — *It has a lot of features and functionalities. Recently, I have found the "student activities recording systems". I can keep the record if a student has participated in any such activity or sport.*

During the observations, an academic user responded about the limits of functionality which made it difficult for those who operate the system. An administrative user also commented that the restriction on using the functionality is affected by security policy to prevent data loss and error. A student also found that constraints in the system functionality meant that the user was unable to keep her information in the system. Users have to input data every time when they need a report.

Academic staff	*Course Guide Editing Systems: it won't let you directly cut and paste. You can't do that from word or even a text editor.*
Administrative staff	*I have made several requests to have certain functions re-instated. Unfortunately, this has not been authorised. Also, a lot of functionalities have been taken away from me.*
Student	*However, it has a bit of problem as the system does not have the record of what I applied for from last time for graduation. So, you need to apply again. You have to fill in the information again.*

An administrative officer explained that they still had to use the manual system as well as SAMS. SAMS did not provide certain functions for specific courses. An administrative staff also explained that SAMS was limited in getting specific information from the database but this could be done in Crystal Reports (an add-on product for generating reports).

A student found that there was no support for using functionality from the system. She had to rely on information in the booklet. She read the information from the booklet and checked against the enrolment screen. She searched for the information but she could not understand it or what to do next. She checked and read from the student guide again. Then she came back to the previous screen but she seemed not to understand the function. She was unable to continue using the system. She kept on reading the guide and looked for help from the support staff.

D. Usability

The participants' comments presented in Tables 17-18 summarise the finding that SAMS is not user-friendly and difficult for people to master. At AU, some users require more training due to the complexity and difficulty of SAMS. For instance, students also report that SAMS is too complicated for them and especially for new students. In this concept, system design and user requirements are the key issues in the usability. The system

developer needs to understand users' needs in order to do their tasks. However, users' comments indicated that system usability significantly compromised SAMS usage.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	SAMS lacks usability. Users need to have training.
Administrative staff (AU)	SAMS is poor because it is difficult to use and understand.
Local student (AU)	SAMS is lacking in usability features and design.
IS manager (AU)	SAMS is complex and difficult for the students to understand.

Table 17 Participants' key perception on System Usability at AU

An academic staff member at AU explained that the system was difficult to understand and complicated to use due to system complexity. It was suggested that the user required more training in SAMS to overcome these issues. The academic user reported that:

Academic staff (AU) — *I know the AMS and it is very hard to use. I actually went to one or two day training course to learn how to use it and you have to do it before they give you permission. Yes, it is a difficult system.*

One person on the administrative staff (AU) mentioned that SAMS is not user-friendly as it is difficult to use. Even though, she had attended training that did not help her understand how to use the system. She still found that SAMS was too difficult for her. Her comment was similar to that of the academic user.

Administrative staff (AU) — *When I started work in this position, I went to AMS basic training and afterwards have just been using it for quite some time. I can say that in two and a half years I cannot use AMS at all.*

An international student talked about the SAMS not being very effective to use when he tried to search for information; the system had confused him as there were many types of

information displayed on the screen. The student also explained that he did not know what to do and had no idea of how to find the information he needed.

International student (AU) — *When you search something, there is always too many things (information) that come up, and you do not know which one to go for.*

In AU, a local student commented that the SAMS should have an improved usability feature. The system needs to be intuitive and easy to use, and especially for new students.

Local student (AU) — *Probably, for the EOL if they can improve it to be more user-friendly. The design should be easier for the first year student who doesn't have experience.*

The IS manager also agreed with the lack of a SAMS usability feature which made the system difficult to use and not well understood by students. She admitted that the system also did not provide enough information that limited the users' understanding of how to use the system more effectively.

IS manager (AU) — *I think EOL at our uni is difficult. It does not make logical sense to the students. Some of the course work subject – it is very difficult for the student to work out which ones.*

Secondary Data

One member of the administrative staff in AU demonstrated that she has many functions saved in her favourites in AMS. She added those while working with the system. Without these favourites, she would be lost as she cannot easily return to the functions. Furthermore, a student cannot find the step or understand how to proceed with enrolment. Then, she read the student guide and checked the previous screen. The user stopped and wrote some information on a notepad. She was not sure what to do. She was looking for support staff.

Thai University (TU)

Participants	Key perception
Academic staff (TU)	System usability affected by poor system design.
Administrative staff (TU)	Users are satisfied with the level of usability in SAMS.
International student (TU)	Users are satisfied with SAMS usability.
Local student (TU)	Students are satisfied with SAMS usability.

Table 18 Participants' key perception on System Usability at TU

In TU, an academic staff member reported the problem of the user interface such as overuse of the menus and buttons, which is blamed on poor design. Many academics found the system difficult and complicated to use, as one highlighted:

Academic staff (TU) *I feel the application has too many buttons that sometimes is confusing us. Also, the names of the buttons do not really make sense.*

In the findings, system usability improves task quality and productivity for users. However, one administration officer asserted that the system would be easier for users if they could spend more time practising it. She suggested that user experience could increase the usability level. As she explained here:

Administrative staff (TU) *It is clear detail and understandable. It is not too difficult and complicated to use if users practice and learn the way to navigate through the system.*

In TU, an international student and a local student commented on the usability of SAMS. They agreed in their comments that the student system was easier to use and understandable. Students found the system was user-friendly and effective. From both students' perspectives, this suggested that the SAMS in TU satisfied the students.

International student (TU) *Actually, when I want to pay for my student fee, then I printed it out. That was not a problem. It's easy for me. I think it is quite easy to use.*

Local student (TU)	*I think the online enrolment is good enough fast, and easy to use. The overall design is quite well and appropriate space. This is very important to us.*

4.2.3 Task category

A task describes an activity carried out by people who work in an organisation and have certain roles and positions. Frequently, technologies are viewed as tools used by individuals in carrying out their tasks (Goodhue, 1995). In a system's usage, task is the function being performed when a user employs a system to do the task. Tasks require resources for them to be properly executed, for example hardware, software, data, etc. The concept suggests that an understanding of the task is required and important to the system usage. When problems and constraints emerge while performing the task, users may develop workarounds which enable them to work out an alternative solution. In this thesis the context of task includes the following:

A. Mandatory System Usage
B. Task Requirement

A. Mandatory System Usage

In this context (task), organisation is the key element of mandatory system usage determining whether a user has an option or otherwise to employ a system so that tasks are done. The following comments made by participants refer to whether the systems are mandatory or optional. The data in Tables 19, 20 summarise AU and TU users' comments on the issue of Mandatory System Usage.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	SAMS usage is mandatory for staff in the university.
Administrative staff (AU)	SAMS is required and mandated for administrative tasks.
International student (AU)	EOL is not mandated for international students. Students prefer to use the online system as it is faster than the manual process.
Local student (AU)	Local students perceive that EOL is Mandatory for them.
IS manager (AU)	SAMS is important and mandated for the task and position of the support staff.

Table 19 Participants' key perception on the system of Mandated Usage at AU

In AU, one academic staff member commented that academics have different options and alternatives to using SAMS. They are aware that some of the systems are mandated while others are not. However, academic staff may not need to use some aspects of the system because they have the option of asking for help from administrative staff.

Academic staff (AU) *Usually, you can't do the program director role without using that. I suppose the ESS is mandatory too because you can't apply for leave. I can't go and ask for that, but someone may be can.*

An administrative staff member (AU) explained that they required the systems in order to retrieve the results or information from the databases. The SAMS are mandatory or compulsory to use as the systems are specifically implemented for administrative tasks, for example, applying for leave, making a report, retrieving specific information and so on.

Administrative staff (AU) *I do, you know. I only use IEAMS. Ok, if it is necessary, I need to get into AMS as well.*

An international student (AU) reported that students have a choice of using the systems for their enrolment or registration, or they can apply for the service from administrative

support staff. However, that option may not be the students' preferred choice as it would take more time to process. One student noted:

International student (AU) — *If you are talking about enrolment online, yes, sure it is very necessary to use. If I am late, I have to enrol in the paper form and pay the fine.*

A local student reported something similar to this international student. However, he understands that the system is mandated. As he explained that:

Local student (AU) — *Now, I only know that I have to use EOL for the enrolment. I do it since I started here. However, I remember that in my first year, first semester, an administrative staff enrolled for me. I just sat there and answered some questions.*

The comments from the IS manager (AU) confirmed that students (AU) have a similar choice of systems when doing their tasks. They can use the system or not. However, the IS manager reports that support staff have no choice but to use the systems.

IS Manager (AU) — *No, I do not have a choice to use it. We do not have any choice but to use AMS for enrolment online.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	SAMS usage is not mandated for academics, but they find the system is more effective than using the manual process.
Administrative staff (TU)	SAMS usage is mandated for administrative staff and their tasks.
International student (TU)	SAMS is not mandated for students but it is more effective to use than the manual process.
Local student (TU)	SAMS is not mandated for students and they preferred to use SAMS than using the manual process.

Table 20 Participants' key perception on the system of Mandated Usage at TU

In TU, an academic staff commented that academics have the option to use the system or the manual approach (a similar finding to the student groups), but using the manual approach takes more time to complete. Most academics are likely to use the electronic systems. An academic staff explained this:

Academic staff (TU)	*Well, the manual is still an option but this is a long process as it needs to go through school, faculty, the head of registrar, and administrative staff.*

An administrative staff also reported that all administrative personnel needed the system for their tasks such as occurs at AU. In TU, SAMS is also designed and implemented for administrative purposes. She explained that the SAMS is mandatory to use.

Administrative staff (TU)	*Yes, important and we need it. Yes, SAMS is very important, if the system is not working, we cannot do the job. University requires our staff to use the SAMS.*

However, an international student and a local student at TU have the same option as international students in AU. They can use the manual approach if they choose to do so.

International student (TU)	*Is it mandatory to use the systems?*
	Well, you can choose not to use the system as you can do it manually.
Local student (TU)	*Yes, but we could go to the registrar or administrative office where they will give us the manual form to enrol.*

In TU, the IS manager admitted that SAMS is mandated for accomplishing tasks. As the manager, he does not have an option and further reported that administrative users are part of the support staff. Therefore, these users need to use the systems.

IS Manager (TU)	*As IS manager and the person who looks after the systems, I would say it is mandatory to use. I need to see if there are any problems, so I have to use the systems. It is part of my job too.*

Secondary Data

Administrative staff: Even though the systems usage is mandatory to administrative staff, they can use manual procedures as well, for example when a student wants to withdraw from a subject. This has to be done manually. Some students went to lab as part of their program structure. Later, they did not want to do the lab. They wanted to drop out of it but the system would not allow them to. Therefore the administrative staff had to use an enrolment variation to change that and this was done manually.

Administrative staff cannot only rely on the systems; they still have to do it manually. The system will give administrative staff a list of the courses and what the students have completed. Yet staff still need to see whether students have followed the guidelines because sometimes they may choose more than one elective, and staff need to check from the application and the system to make sure it is correct. Students often made mistakes in their enrolments.

B. Task requirement

The comments in Tables 21 and 22 reported that the SAMS was required so that users could do their tasks. The comments also reported that SAMS was important to most of the staff and students. The findings were that SAMS had significant impacts on both tasks and users. In this concept, task and system are considered to be the key issues in the context of task requirement.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	SAMS is required for specific tasks and users.
Administrative staff (AU)	SAMS is required for administrative tasks.
Local student (AU)	User perceived the requirement to use SAMS for tasks.
IS manager (AU)	SAMS is important to the tasks of support staff.

Table 21 Participants' key perception on Task Requirement at AU

One member of academic staff reported that administrators are required to use SAMS to perform their tasks. In the school, academics perceive that AMS is one aspect of SAMS which academics do not need. Therefore, AMS (SAMS) is mainly designed to serve administrative functions. As one academic explained:

Academic staff (AU) *I know the administrative use of AMS, but for us, we are not using that. We concentrate on teaching.*

Administrative staff are usually involved and required to use SAMS in order to access information from the university's database. In the school, administrative staff need the systems to service and support other staff members and customers. SAMS is considered as essential to administrative task requirements.

Administrative staff (AU) *Administrative staff need to serve the customer quickly and effectively, and often we have to go to different systems and other applications to investigate that particular issue. It is our task.*

A local student stated that she required the system in order to check and use certain information such as subject enrolment, classroom and results. It was felt that:

Local student (AU) *Every time when I have something to do with the university, for example, I have to find out the information of my enrolment or the courses.*

The IS manager (AU) reports that support staff are required to use the systems because they are responsible for them. They need to use SAMS in order to support students and other staff members.

IS manager (AU) *We are responsible to AMS and other systems. We have our support team for maintaining the systems. This is our task. So, we need to use the systems.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	SAMS is designed to support administrative staff and most of the users in the organisation.
Administrative staff (TU)	Users need only rely on SAMS.
International student (TU)	Users are agreed that SAMS is necessary and required for students.
Local student (TU)	SAMS is required and important to the students.

Table 22 Participants' key perception on Task Requirement at TU

SAMS is designed to support academic tasks such as transferring students' results, creating reports, etc. In TU, SAMS is an important tool for these users as one academic person suggested:

Academic staff (TU) *We need the system to submit the grade reports for university and students. Yes, we must use it for that purpose.*

In TU, SAMS is needed by staff for processing reports. The user is required to use the system in order to obtain the information they need. If the system is unavailable, it will impact on users as they have no other alternative to retrieve information from the system. One administrative staff member explained about the effect when the system was down.

Administrative staff (TU) *If the system is down, I cannot do much. I need the forms which are kept in the system. Otherwise,*

I cannot print out the forms, when students come to request it.

In TU, the comments from international students suggested that students are required to use SAMS to access their information. The SAMS is important to the students for checking their subjects and enrolments. They also found that like other users at TU the system affected them when SAMS was unavailable. An international student explained that:

International student (TU) *Well, I think the only problem is coming from the grading system. If it is not working, students cannot check their results and enrolments.*

The comments from local students were similar to those of the international students. Students were aware that the system is important such as accessing enrolment information. A local student said:

Local student (TU) *When I was looking for the grade, I needed to know which subject was and what score I had. Also what is my average score and result. So, I need to use the system.*

The comment from the IS manager also described the support staff as requiring the system in order to support users. The system is important to the support staff as well as the IS manager. He explained that:

IS Manager (TU) *If students come to enrol with the same subject, the system will automatically lock up. So, I need to amend the problem and enrol for them. Then, I need to check and monitor it, and try to solve this problem.*

Secondary Data

This section consists of observations from administrative staff who often use the SAMS. Administrative staff: Mainly, staff members use IEAMS for student search and/or listing the course's class and information. In the administrative role, the user needs to use AMS, as he needs to execute the task for the student's application and selection. In the academic roles, staff use SAMS for checking student time-table as well as course information.

4.2.4 Organisational Category

An organisation is a social collective in which formal procedures are used for coordinating the members' activities in pursuit of joint objectives (Beynon-Davies, 2002). The various aspects of an organisation, such as its structure, culture, process, strategy and infrastructure (Beynon-Davies, 2002), influence the development, adoption and use of information systems in many ways. The organisation must ensure that accessibility, reliability, accuracy, privacy, and security of information function at a reasonable cost (Gordon and Gordon, 2004). There are two concepts that refer to the organisational context:

A. Organisational Policy
B. System Implementation

A. Organisational Policy

In general, an organisation has a number of policies, rules, or regulations that apply to members. The comments in Tables 23, 24 reveal that the university policy has influenced how SAMS functions. For instance, the policy determines access to and restriction protocols for SAMS usage in the schools, by staff, and students. In this concept, user, task and organisation are the key factors influencing organisational policy.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	The security policy controls and manages the users for accessing the university information.
Administrative staff(AU)	Users' accessibility is directed by the management policy.
International student (AU)	Students perceive that they must use SAMS for their enrolments.
Local student (AU)	Students are required to use the EOL.
IS manager (AU)	SAMS is mandatory to the task and position of support staff.

Table 23 Participant's key perception on Organisational Policy at AU

One academic reported that information is considered to be highly confidential and the university does not want anyone to be able to access or manipulate it. Therefore, users must apply for and request access to it from the university. The policy is non-negotiable and applies to all staff if they want to access and change any aspects of information in the system. One academic staff member pointed out that:

Academic staff (AU) *Once you upload the material, then you need the authorisation changed. This will take time because the person who is responsible for this task needs to examine the content first. I think it is the procedure.*

An administrative officer mentioned that the university has implemented the security policy to prevent users from making amendments to the system because to do so is illegal. However, with such a limitation on access and some aspects of functionality in the system, these policies have significantly impacted on users. In particular, the school and administrative staff were unable to use and access the information from the database for their duties. One administrative staff member said:

Administrative staff (AU) *Before, I could access it. Now, the system is restricted to certain access or certain users. Unfortunately, that has now impacted on the way we can conduct administrative tasks.*

The comments from international and local students also reported that students are required to use the SAMS for their enrolments as directed by the university's policy. They perceived that students need to use the system as this is directed by the university.

International student (AU) *You have to use online enrolment for some subjects, choosing the course, the graduation, and checking of time-table.*

EOL is compulsory for students when they enrol. As one local students stated here:

Local student (AU) *No, we have to use online enrolment. They get us to use online system.*

The IS manager stressed that the university's policy refers only to certain users when access to AMS (SAMS) is required. For this reason the university has provided IEAMS to staff.

IS manager (AU) — *With the new policy or procedure, now the organisation wants all new staff or new recruits to use IEAMS instead of AMS. I can say that again because you can't change or edit something there.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	The university policy is not accommodating to users when they use the systems.
Administrative staff (TU)	Staff require authorisation before proceeding to contact the vendor.
International student (TU)	Students must check their subjects and prerequisites before enrolment.
Local student (TU)	Users are required to update and change their passwords as required by security policy.
IS Manager (TU)	SAMS is constantly updated and modified to meet the university's requirements. The new university policy is to redesign the subject and curriculum.

Table 24 Participants' key perception on Organisational Policy at TU

In TU, an academic staff member mentioned that users are also required to use the SAMS for entering students' data and submit the results to the registrar. This procedure is directed by university policy.

Academic staff (TU) — *We need to use the system to submit the results and the university gives us a few days in doing this.*

At TU one person who works in administration stated that users needed to make a report to the manager when they found a problem in the system. Then the manager must receive the

authorisation before proceeding to contact the vendor. This is the regulation and procedure for administrative staff in the university.

Administrative staff (TU) *Regarding the technical problems, we need an authorisation from our head of division to contact the vendor. This refers to the university budget.*

In TU, there is a policy restriction which applies to students using the SAMS. In order for students to enrol in subjects or programs, students must check the subject's requirements or its prerequisites. Students must provide the information relating to the subject before they will be eligible for enrolment in it. An international student explained that:

International student (TU) *When I tried to register for another major subject I couldn't do it. It is only allowed to register if you are on the right major that you are enrolled. The system was locked too. I couldn't access this.*

In TU, the security policy requires the user to proceed with a password in order to access the system. However, a student mentioned that changing the use of password often led to confusion as many students could not remember their passwords.

Local student (TU) *Now, students need to change the password every semester. The password must be a combination of number and letter with eight characters at least. This is therefore, forcing me to remember and confusing of password for myself.*

The IS manager reported that SAMS needed to be improved according to the university's plan. SAMS also needed to be adjusted and re-designed to meet the university's requirements. The policy and procedure have been released to the administration and support staff who have the responsibility of maintaining and servicing the system.

IS manager (TU) Also, we need to improve some processes and functions in the system, as when the university

has issued a new policy. We have to keep adjusting or amending that every time.

B. System Implementation

System implementation is the process required to put the system into place so that it is fully operational. System implementation involves many processes, for example the installation of hardware and necessary components, configuring and testing the software, customising the functional requirements, performing data conversion and migration, reporting the specific project, completing the test and approving the installation. Many system implementations have high failure rates and the consequent impacts are detrimental to business (Wong et al., 2005). It has been found that lack of understanding of the task, functionality and user requirements are the principal problems in system implementation. Consequently, the organisation and the system are the key factors in this concept. The data in Tables 25, 26 summarise AU and TU users' comments on the issue of Poor System Quality.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	SAMS was not effectively implemented to handle users' information management and activities.
Administrative staff (AU)	AMS does not support accessibility over the internet like IEAMS.
International student (AU)	Student system is not fully integrated; users need to access it more than once to do the task.
Local student (AU)	The system has limits and constraints due to system design.
IS manager (AU)	IEAMS cannot provide and update information due to the limited upload function.

Table 25 Participants' key perception on System Implementation at AU

In AU, an academic staff member mentioned that the SAM systems were not comprehensively implemented and therefore not able to support users and their tasks. One

academic complained that SAMS cannot manage the information which the system should do. She described this as follows:

Academic staff (AU) *We don't actually have a very good system for managing student progress. And so the administrative staff more recently think about creating Excel spreadsheets and putting information about student progress in there. So, a better system could be done if we could afford that.*

An administrative staff member commented that SAMS is not fully compatible with the university system. He mentioned that some problems with the system emerged when the system was implemented. Although SAMS was originally designed for the American market, the implementation proceeded by adapting and changing the system to fit into this particular university. An administrative member of staff reported that some problems emerged.

Administrative staff (AU) *We already know that they have three semesters and rather than two and they start around middle of a year, and I think this is one of the original problems they have with AMS, because it is an American model which starts in September, when they start their first semester. So, I think it was necessary to change its nature to the AMS to suit the Australian model. And I think that is where the problem was.*

One international student commented that the system was not a fully integrated system or had a complete set of applications. He explained that in order to use one of the functions, students must first gain access to the main system. For instance, they needed to access another system to process the timetable.

International student (AU) *Yes, if you are using student email and then you go to the enrolment online, you must log-in again and when you want to use or see something else you must do that again and again.*

A local student complained that the system has limited time out. She was unable to complete her task because the system stopped while she was completing a process. She said that:

Local student (AU) *I hate it because when you are using it for a while it will log you out. Yes, it will log you out. So, I have to keep logging in.*

The IS manager reported the system limitations in terms of SAMS not being able to provide up-to-date information until the next day or for at least 24 hours. The results of system implementation are found to be similar to the comments made by the administrative user.

IS Manager (AU) *Well, both IEAMS and AMS are using the same data. If you really want to know how many students are enrolled or stuff like that then AMS. IEAMS, user needs to wait until the next day for a refresh of the system.*

Thai University (TU)

Participants	Key perception
Administrative staff (TU)	The lack of skills and understanding of the project leader impacts on the system implementation.
International student (TU)	Inappropriate user interface and contents create complications for users.
Local student (TU)	User frustration due to the system constraint which limits and embeds within the system.

Table 26 Participants' key perception on the System Implementation at TU

In TU, the lack of experience and understanding of system functionality has been reported by administrative staff. The comments recorded that the implementation project failed to identify the necessary information for the requirements and functionalities in order to customise the system. According to one administration officer:

Administrative staff (TU) — *The system has many functionalities and the people who had responsibility for the project did not understand the complexity of the functionality. They have never used the system.*

International students commented about the inappropriateness of system interface which made the system more difficult to use. A student mentioned that he found there was too much information which led to user difficulty and confusion.

International student (TU) — *I would say the information which has been provided on our university website is too complicated and confusing for us. Whatever the information they have, university put it all into the same webpage.*

A time-out feature was a constraint in the system implementation which caused a problem for users. Many students were frustrated when they accessed and used the system. The problem was found similar to that experienced by local students at AU, as the student system is designed to have a time-out function.

Local student (TU) — *One user account can log-in and use for two hours. Yes, we are all disagreeing about this restriction. We found that set-up is not convenient for us too.*

4.2.5 Usage Category

Usage refers to activity that serves as the conjunction of system, task and user. Furthermore usage is the activity of using or employing something that is permitted or established by

custom or practice (Dictionary, 2000). In the university, staff and students use SAMS for their tasks as directed by the organisation in the form of university policy. Therefore, usage is an important factor in this research study because it describes what the user's action is, or performs, when he or she is using the system. In this thesis the usage categories consist of the following concepts:

A. Workaround
    a. Adaptation
    b. Manual Workaround

In the usage category, the findings refer to the concept of workaround which serves as a broad concept based on the users getting around SAMS-related problems. As a result, a combination of various workarounds such as adaptation and manual workaround could have been integrated in to one single workaround concept (see Chapter 2, the Literature Review). However, in order to explain the findings as clearly as possible, the workaround concept was expanded into two related but different concepts.

A. Workaround

The research found the users chose to work around when the system did not match or suit their workflows. In some situations, users employed 'workarounds' due to technical difficulties or other constraints that compromised the ability to support and satisfy users. Quite often, workarounds were created to bypass and overcome SAMS limitations. Here the user and the system are the key factors in the 'workaround' concept. The data presented in Tables 27, 28 summarise AU and TU users' comments on the concept of the use of Workaround.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	Workaround is required when the system cannot support the user.
Administrative staff (AU)	Users employ workaround as the alternative way to support their tasks.
International student (AU)	Users employ workaround to support compatibility problems.
Local student (AU)	Users employ workaround to support compatibility problems.

Table 27 Participants' key perception on the use of Workaround at AU

SAMS is limited in that it cannot fully process student information. According to one academic staff the information should include students' details such as address and contact information. However, another academic staff member described that as still constituting insufficient information and so she created her own list of information with a spreadsheet.

Academic staff (AU) *Thus, it is very important to setup my own spreadsheet with students in and their numbers and other information, because a lot of information that we know about the student has not been found in the AMS.*

One member of the administrative staff reported that users employed workarounds to make the system respond to their tasks because SAMS was not originally designed for their tasks and working environments.

Administrative staff (AU) *They mention that AMS did not introduce to our university, and we have to work around that. With AMS at least we try to modify the system to suit us and they discovered that in the process it has been very difficult.*

An international student and a local student commented that SAMS is not compatible with other applications such as web browsers. Both students stated that SAMS does not fully

support hardware and software platforms. Therefore, students use a workaround to find another way to solve incompatibility issues.

International student (AU) — *When I'm using Mac with Safari, go to check the exam timetable and exam result. The system always kicks me out. But when I was using PC with Windows with Firefox, I got it through. However, that may not be the whole truth. I also have two Mac machines. I have tried one with Safari and one with Tiger. So, the Tiger works but the Safari could not get the same result.*

A local student explained how he overcame the system incompatibility issue:

Local student (AU) — *As it doesn't work well with my web browser, opera, I got to use internet explorer. Yes, it is compatibility issues. Well, you can't upload the file. You have to use IE instead of Firefox. Yes, you are very limited with what you can use.*

Thai University (TU)

Group of participants	Key perception
Academic staff (TU)	Using workaround to support the functional misfits in SAMS.
Administrative staff (TU)	Manual workaround supports the process of validation.

Table 28 Participants' key perception on the use of Workaround at TU

An academic staff member (TU) reported that the system cannot control and limit the number of students enrolled in a particular class. The user needed to enter specific data so as to manipulate the system processing in order to make the system work. This method was referred to as the workaround since the system's current functionality was limited.

Academic staff (TU) — *So, I have to adjust the results from other class they attended. I do remember that if I do not enter*

'0' mark into every student score; I wouldn't be able to adjust the students' grade.

In TU, the university administration needs to validate the reports of students' results in preparation for student graduations. An administrative staff member explained the method used for this particular task was a manual workaround, simply because SAMS could not be relied upon. He explained that:

Administrative staff (TU) — *We have the process to minimise these problems by sending the students' results to the program director. The program director will be checking the results with the lecturers in the program with the student examination results. However, this is done manually by using the report files to check against the print outs.*

This section covers other comments and observations from SAMS users describing the need for workarounds. One administration person described how she was using a spreadsheet which is the most common way of producing reports and manipulating data from AMS and IEAMS.

Administrative staff — *I use IEAMS to import information into a database and download to a spreadsheet. So, it is useful for what I need, for example, the report I find is better than in AMS. I will get them in Excel spreadsheet. I can manipulate the data and etc. IEAMS does also provide you with an Excel spreadsheet, but in order to obtain the criteria, putting in the criteria on the system.*

In response to such system limitations, administrative staff created the workaround as a way of manipulating and retrieving information from the SAMS database. An administrative staff member reported using the workaround to extend the system's capability, by using a specific add-on module to the SAM system.

Administrative staff	*Now, we develop SMS and Mail function and add-on to the system which will enable administrative staff to send data, news, and information to students and other staff.*

Secondary Data

Administrative staff: a staff member explained and demonstrated how to use IEAMS by using Firefox browser as the alternative browser due to compatibility problems. She explained that the web browser is more stable when copy–pasting the formula and the link. The staff also showed she used IE to copy and paste, and then the system was hung. Later, she opened the Excel program to import that data into the worksheet. This method is considered to be a workaround because an external system has been used.

a. Adaptation

Based on the reported comments, users needed to adapt to the system to overcome any system difficulties. Adapting to the problem means finding a permanent workaround, using what tools are available, as well as online resources, to work around the problem permanently, though not resolving it (RTFM, 2014). According to Ho et al. (2004), adaptation is essential because it is rare for an ERP system to perfectly match the environment in which it is employed. For instance, the SAMS's constraints impacted on users because they could not use the system to do their tasks. Many users also mentioned that the systems were complicated to operate. As a result, some users adjusted and applied different processes. Users employed different methods that they improvised because they proved to be effective. In this concept, the user and the system are the key factors in the adaptation method. The data in Tables 29, 30 summarise AU and TU users' comments on the Adaptation Concept.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	The system is not fully customised for the university setting; users need to adapt to use the system.
IS manager (AU)	Users need to adapt to understand the system.

Table 29 Participants' key perception on Adaptation at AU

In AU, an administrative staff member explained that SAMS was originally designed for the United States and various European countries' education systems. However, SAMS has been implemented at this university. The vendor modified and re-arranged the system in order to fit into the university structures because AU is part of a different education system. However, many administrative staff found that the system did not fit well into the university's structures and tasks of the schools' administration. Therefore, in order to complete the tasks, users perceived that they had to apply some changes and adapt to using the system for everyday work processes.

Administrative staff (AU) *It was a system generated for the American tertiary system and it was brought into Australia education, for Australian universities, and what we identified is that we have to fit them all.*

In AU, the IS manager reported that users were required to understand and adapt to the system. However, she asserted that it was not the problem or limitation of the system but it was the manner of system design.

IS Manager (AU) *So, it is not really the problem with the systems. But it just takes some knowledge from people, or experience. Wrong spelling is one of the mistakes that can happen most of the times. It is up to the users, you know, not the system.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	Users need to adapt to use the system in order to process results.
International student (TU)	User adapt to the way of accessing the system.
IT manager (TU)	The system needs to be adaptive and modified before it can be utilised.

Table 30 Participants' key perception on Adaptation at TU

In TU, a member of the academic staff reported that the system was unable to detect and identify those students who were not actually enrolled in the class. Therefore, the user needed to apply a process where they could create an accurate students' list. An academic user explained that:

Academic staff (TU) *We have to fill-in the zero score, so as to fail them to make the new class list. Then, we can check with their enrolments.*

An international student at TU mentioned that many students found it difficult to find the information or a way to access the system. However, some students created a link as a shortcut and saved that link as the favourite function when needing to access the system. This method echoed that of administrative staff in AU.

International student (TU) *I created the direct address to go to our school. I do not need to go to the main university web page first. This is saving time for me to find what I am normally using.*

In TU, the IS manager admitted that the SAMS had to be adjusted to suit user tasks. The functionalities also needed to be modified in order to improve the system usability. The manager described this here:

IT manager (TU)	*We have modified the system to use. For example, I have to add some menu into the student enrolment page. So, students can print, instead of using the print function from web browser. It is much better. Also, it needs to improve some of processes and functions in the system. So, we don't need to wait for the software developer.*

Secondary Data

Academic staff: A staff member needed to log-in to the page and used three to four steps to apply and confirm the editing or changing of certain information. Staff explained that functions in the Course Guide Editing System were limited. The system would not allow the user to copy, cut and paste. Also, the user cannot copy into other tools such as Microsoft Word or a text editor.

Administrative staff: An administrator used the search function in the IEAMS to find a student in the class. She keyed the student number, to make sure that she received the correct student number. Then, staff copied and pasted the student number onto the spreadsheet in the student column ID and looked it up when they completed their programs. Again, she copied and pasted it twice so as to make sure that she got the correct information.

Student: When a student enrolled online, first she looked at the enrolment check list. She said that she did not know much about which subjects are available, and she spent quite a while reading the information from the enrolment pages. She knew that she needed to choose four subjects; however, she had chosen five subjects, as she thought it was better for her to do that in case there was no subject available to her.

B. Manual Workaround

The findings summarised in Tables 31-32 present participants' comments on how the manual method is needed when the system fails or is unavailable. The finding of the 'Manual Workaround' concept is an additional or alternative method that users employ to

support their tasks. It differs from 'Adaptation', in that for this concept, the system is avoided and not used and the process remains the same. In 'Adaptation' the process is adapted to the SAMS. The responses showed that academics, administration staff, and the IT manager agreed that the manual method is still important as it represents an alternative way to do tasks. In this concept, system and task are the key factors of the manual workaround.

Australian University (AU)

Participants	Key perception
Academic staff (AU)	Manual process is employed when user has no access to the system.
Administrative staff (AU)	Manual process is still required and important in the university.
IS manager (AU)	Manual process represents an alternative for accessibility.

Table 31 Participants' key perception on Manual Workaround at AU

In AU, an academic staff member explained that she needed to use the manual method to do the task. For instance, some academic staff do not have the authority to upload results into the SAMS. She explained how she did that:

Academic staff (AU) *When at the end, we have internal marks. So, I just fill them in Excel and give the hard copy to the administrative. I have to do it this way.*

Most administrative staff found that using paper-based forms is still an important requirement for administration duties. Regarding the problems when the system crashes or is unavailable, users employed the manual method. An administrative member of personnel mentioned that in other areas of university administration, the manual method is still required as a back-up resource. She explained that:

Administrative staff (AU) *It's many times the system fall off that make us worried. That's why we keep our own like traditional way "photocopy" to keep the reference manual. We are all aware of this matter.*

The IS manager in AU admitted that using the manual process is required because it is available and simply is able to overcome any constraints in the system. Also, there are limitations in the system where students cannot be supported, e.g. students with a disability such as a visual problem.

IS Manager (AU) *Then yes, we can revert to the paper-based form. Yes, sometimes some programs are not online.*

Thai University (TU)

Participants	Key perception
Academic staff (TU)	Paper-based form is used as back-up source of validation.
International student (TU)	The system and manual process are still required in the university.
Local student (TU)	Manual process can support users when the system is unavailable.
IS manager (TU)	Manual process is useful but it is also a slow process.

Table 32 Participants' key perception on Manual Workaround at TU

A similar finding for using a manual workaround strategy was reported by academic staff at TU. One person reported that many staff were using manual methods to process and prevent mistakes or errors from entering the system. Another academic staff member found that the manual-based method was more reliable than SAMS.

Academic staff (TU) *Quite often, we have to go back and look into the student scores where we have entered it. So, we have to keep student exam papers as the reference. If the system is not working, sometimes, we have to process the student's grade manually.*

The manual procedure is considered to be time-consuming and inefficient. However, administrative users agreed that there was no alternative way to process and check for approval and validity when electronic systems broke down. One administrative user stated:

Administrative staff (TU) — *So, we need to check against any error from the system with our papers, because the information processing is not always correct or up-to-date.*

In the case of student enrolments, the manual method is still employed as the back-up or alternative method to cope with problems such as when the system is not available or breaks down. In TU, many students have applied the manual method to process their enrolments.

Local student (TU) — *However, I found the system often fails or crashes when using it. Sometimes, when the system does not process the information, we can go to the registrar office to make the amendment and they give us the manual form to enrol.*

The IS manager mentioned that the manual method was employed because the electronic or online system was unavailable.

IT/IS manager (TU) — *Sometimes, we are using the enrolment application for students by fill in the student information and process that manually one by one. This is an option in the university.*

This section outlines other comments and observations from SAMS users (administrative staff, academic staff, students) in describing the manual method as an alternative to SAMS.

Academic staff: — *I can check my class, where the schedule of the classes and how many student and get my class list of the students' enrolled. From that I would draft my class list and use it for my mark. So, I manually use it in a spreadsheet.*

Administrative staff: *Quite often, academic staff did not know how to use the AMS to enter student grade and score as they found difficulty with the system. So, they used the spreadsheets and came to us to do the enrolment.*

Secondary Data

Administrative user: The user retrieved data from the SAMS and copied it into the spreadsheet and sent it to the archive in the network drive. Staff also printed out the spreadsheets. She explained that "if someone needs to see the results, they can ask for it. That is all keep in the spreadsheet folder". The user said that sometimes, she has written it on a piece of paper and on a notepad. She copied the students' ID numbers onto the spreadsheet in the student column ID and looked up to see whether she had completed these details. She said that using a spreadsheet is more reliable than using the system, but it is slow process during the students' enrolment period.

4.3 Summary

In this research, a case study of system usage is employed to identify and understand the impact of SAMS usage, the perception of users, and comparative differences between two universities. The follow-up of interview and observation (the secondary data sources) is used to validate the findings. This approach also helps to clarify the concepts or themes that may overlap during the focus groups and interviews. In particular, the research uses data from the observations and interviews to identify the existence of system usage. By utilising different data collection techniques, it is possible to achieve greater accuracy and a more confident interpretation of a phenomenon, than would be possible with one viewpoint only (Kaulio and Karlsson, 1998).

This chapter presents the concepts of the empirical findings based on an analysis of SAMS usage at AU and TU. Several findings arose out of the data analysis and they were organised into five categories or contexts of the systems usage framework: user, task, system, organisation and usage. First, the category of user comprised concepts of

accessibility, training, and user requirement. Second, the system category consisted of system quality, poor system quality, functionality, and usability. Third, the task category contained the two categories of task requirement and mandatory system usage. Fourth, the concepts of organisational policy and system implementation were classified as the category of organisation. Finally, the usage category consisted of the workaround concept with the sub-concepts of adaptation, and manual workaround. In summary, each concept emerged from the analysis of the open coding and constant comparative approach. The findings provided brief comparisons of participants' comments that described and reflected the conditions where SAMS operated in both universities. The findings also revealed the important characteristics of the systems usage. These were included in the perceptions of users and their reactions to the systems. The findings from this research will make a significant contribution to our knowledge of SAMS as an example of ERP when considering how electronic information systems are subject to the forces of globalisation. These findings will be discussed in Chapter 5.

5 Analysis and Discussion

In this chapter, the researcher presents the analysis and discussion of concepts as well as the theory emerging from the research findings. The researcher identifies five categories and these are organisation, system, task, user, and usage. These concepts are presented as the consequence of the emerging theory and they are described in terms of 'how the SAMS are being used' in the AU and TU case studies. Specifically, grounded theory has been employed to explore the findings arising from participants' comments. Furthermore this chapter makes a comparative study of these two cases. The objectives of this chapter are as follows:

- To understand the Grounded Theory Analysis and the Concepts of the Research;
- To identify the theoretical relations between the concepts of the study;
- To understand the outcomes and implications of the case study of systems usage in the context of a university.

5.1 The Development of Theory

In this stage, the researcher applied the paradigm model that presents "the interplay between macro and micro conditions (structure) and their relationship to actions/interactions (process)" (Strauss and Corbin, 1998). Kendall (1999, p 747) adds that "This paradigm model is an organizing scheme that connects subcategories of data to a central idea, or phenomenon, to help the researcher think systematically about the data and pose questions about how categories of data relate to each other" (Kendall, 1999). According to Goulding (2002) "It constitutes a form of conceptual map which gives order and structure to the subsequent analysis provided in the research". Gibbs (2002 p.171) asserts that "the causal conditions produce the phenomenon which in turn gives rise to strategies in the contexts of intervening conditions to produce actions and interactions that result in consequences". This allows the researcher to reconstruct the original data in

such a way that its broader context becomes apparent (Mills et al., 2008). Strauss and Corbin cited by Kendall (1999, p 748) explain that the paradigm model is "a thinking style of cause and effect that that can explain why and how phenomena occur". Thus, the results of using the paradigmatic model are explained and presented as follows:

Causal conditions: At the macro level, universities want to improve their management and operation processes (change management) throughout their faculties, departments, etc. The system implementation phase consists of developing and testing the system's software, documentation, and new operating procedures, which also includes the installation of the new system, selection of the most suitable conversion approach, preparing the organisation and the users to adapt to the new system, and ensuring that the system is supported after it is put into operation. In this scenario, SAMS are implemented in the universities to improve their processes and overall development.

Phenomenon: System quality is referred to as the phenomenon at issue here. The outcome of poor system quality results from causal conditions that are evident in policy shortfalls and implementation constraints.

Context: A context represents "the specific set of properties that pertain to a phenomenon; it is also the particular set of conditions within which the action/interaction strategies are taken to manage, handle, carry out, and respond to a specific phenomenon" (Strauss and Corbin, 1990). Under the conditions of system usage, SAMS are mandated to the users by the universities. In universities, staff and students require SAMS to do their tasks. In particular, administrative staff are the users who need and use the system as part of their duties and routines.

Intervening condition: These are the factors that influence system usage and impact on poor system quality outcomes. The misfits and shortfalls of the systems include accessibility, functionality, resources, training and usability. In this research, these concepts are referred to as the intervening conditions that relate to the incident or phenomenon of the poor system quality.

Action/Interaction: The reaction of formulating a workaround which relates to a problem or constraint. Strauss and Corbin (1990) define the action as "directed at

managing, handling, carrying out, responding to the phenomenon as it exists in the context, or under a specific set of perceived conditions" (p. 104). In the action, users employ a workaround to cope with the circumstance of systems implementation and policy. Users adapt and manually use the system in order to bypass the problems or constraints which lead to the user requisitions and requirements.

Consequences: The outcomes that arise from the action/interaction and phenomenon as a result of how users operate the systems and what they perceive to be their systems usage. Therefore, users' requirements are expressed in terms of accessibility, functionality, resources and facilities, training, and system usability.

A graphical representation of the paradigm model can be seen in **Error! Reference source not found.**.

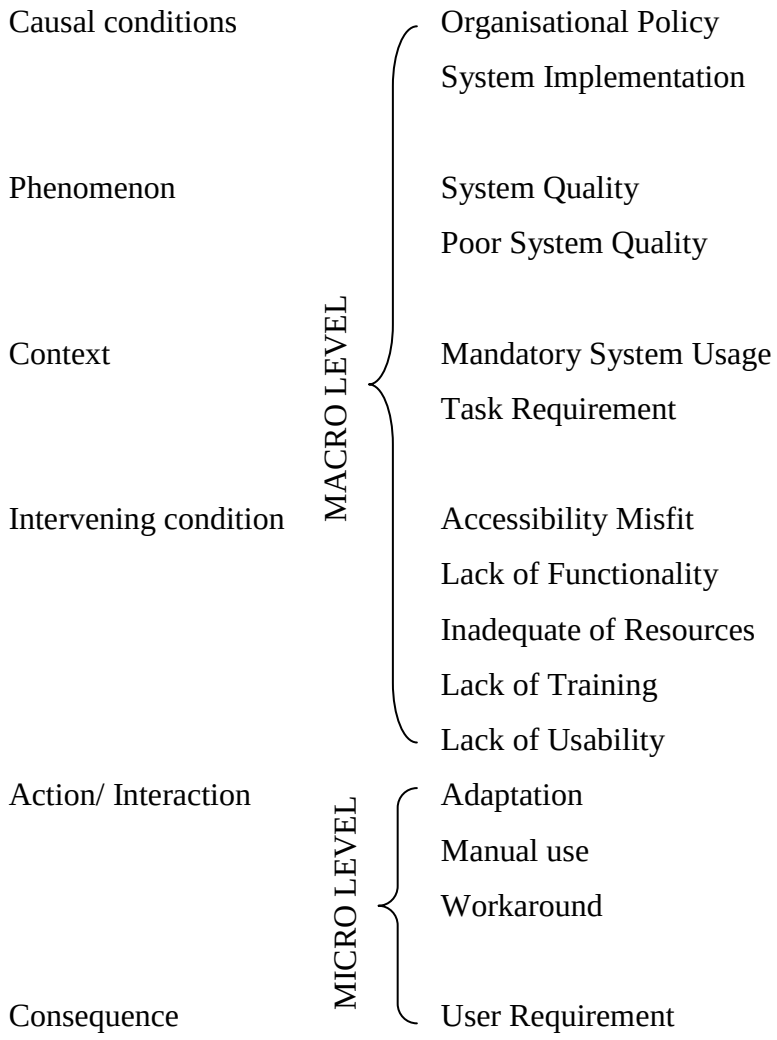

Figure 14 The Paradigm Model of the SAMS Usage (AU, TU)

5.2 The Concepts' Relationship

From the open coding phase which was described in Chapter 4, the research findings presented five categories that contained 15 items. Consequently, the axial coding phase analysed and sorted through the concepts which applied a constant comparison approach through the list of the categories, identifying their relationships with the items or concepts from the open coding phase (Figure 15). In this process, Yee (2001) cited by Jones (2007) states that 'modifiability' is "the characteristic of the developed theory to be able to change as the basic social process changes as: Grounded Theorists see the world in a constant state of flux. As such the theories they produce must be able to accommodate change". Moreover, Goede and de Villiers (2003, p. 281) state that "various categories need to be integrated to form a theory". Besides, Strauss and Corbin (1998) suggest that the analyst should select one of the ideas as the central category and then relate it to the other category (or categories) of that central idea. Thus, the supporting statements from the objective of the research study and research findings are applied and they constitute the relationships of the main theme.

Consequently, the result of the comparison of incidents and the properties of its categories allow the categories to become integrated. This process allows the 5 categories and 15 concepts to form and consolidate as the substantive theory underlining the research topic. The result of selective coding presents the overall framework of the 15 concepts which represent and explain the phenomenon of how the SAMS are used in the university (see Appendix M: The flows of the phenomena of the SAMS usage). Based on the conceptual framework, the researcher identified the system usage categories and its concepts that describe their relationships below.

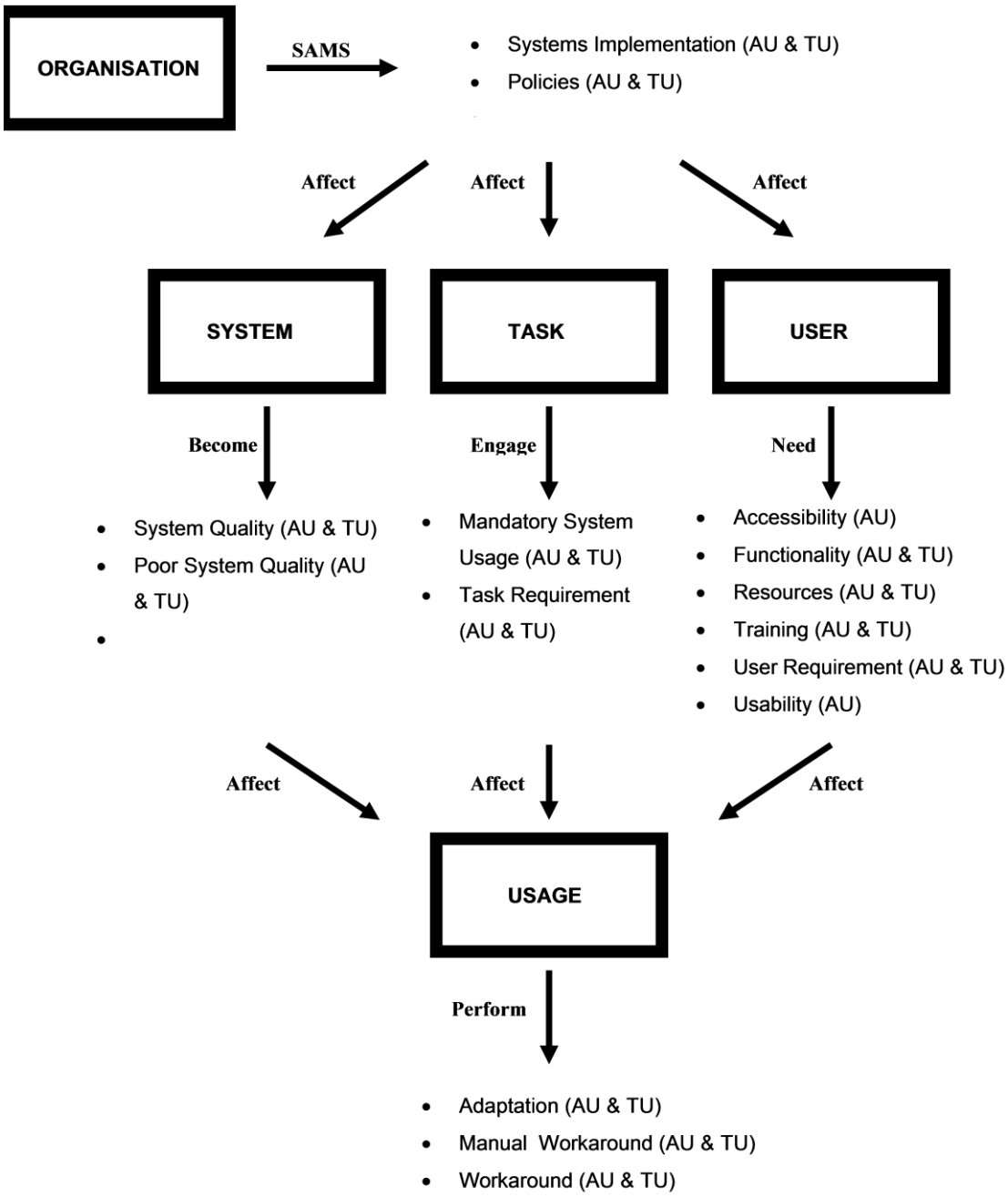

Figure 15 The Conceptual Framework and the Concepts of the SAMS Usage

5.2.1 Organisation

It is important to anticipate the nature of this organisational impact prior to a system's implementation, as often a certain system cannot function within the organisational environment (Wijnhoven and Wassenaar, 1990, Doherty and King, 1998). For instance, Sommerville and Rodden (1996) found that organisational influences in which the

software process was organised and managed, reflected organisational priorities rather than technical needs. Also, Curtis et al. (1988) cited by Sommerville and Rodden (1996) discovered similar "organisational influences, which in practical terms, reduced process, and product quality". Therefore, an organisation and its policy are the important issues to foster and they reflect how effective a system is.

A policy is a statement of agreed intent that clearly and unequivocally sets out an organisation's views with respect to a particular matter (Inc., 2010). Consequently, policy and procedures describe organisational rules and guidelines, and explain how to do a particular job or jobs (Capel, Ioannides, Mcreavy and Wilson, 2005). The effect of organisational policies is to provide one mechanism to ensure that individual interests are managed for the greater good, and to ensure that individuals within the organisation are moving forward in the same direction (Bryson, 2006). In general, IS policies are used as a guide to organisational management and control which are specified and assigned during the system design and implementation. Before IS implementation, the organisation makes a choice as to which kind of package and module to install. When the university decides on the development and implements the systems and technologies, policy is the most fundamental implication of the organisation's development. It has a significant impact on individual and organisational activity, change, and performance. As to the nature of policy, it is also the set of constraints which an individual or organisation wishes to place either on the process of designing a system or on the product which is a result of that design (Dobson and McDermid, 1989). In this research study, organisational policy is defined as the property of the organisation which leads to the system implementation. The organisation category and its concepts depicted in Figure 16.

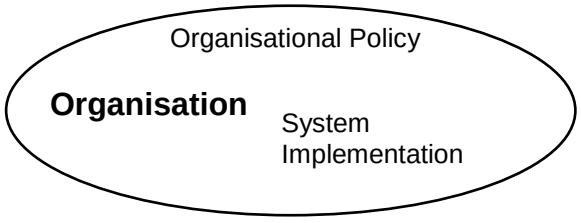

Figure 16 The Organisation Category and its Concepts

5.2.2 System

Many organisations are replacing their legacy systems with computer-based technology as the information systems to perform the tasks and other activities. There are many issues in terms of system quality which lead to the IS usage. According to ISO 9000:2000, quality is the degree to which a set of inherent characteristics fulfils requirements (ISO 9000, 2000, Glinz, 2007). According to Oliver and Romm (2000), the qualities of ERP systems broadly reflect the deficiencies that existing systems possess, these consisting of flexibility, usability, accessibility, integration, and workflow. Quality is also a characteristic of a product or service that reflects how well it meets the needs of its consumer (Negash, Ryan and Igbaria, 2003). On the other hand, there are factors which cause the systems to become ineffective or be of poor quality. For example, problems such as system usability, including system reliability, hardware and resources, inaccessibility, and inadequate training and support, are part of the organizational responsiveness which affects the quality of the system. In general, information systems are determined and directed by the organisation. Therefore the quality of the system reflects the organisational setting. The system category and its concept presented in Figure 17.

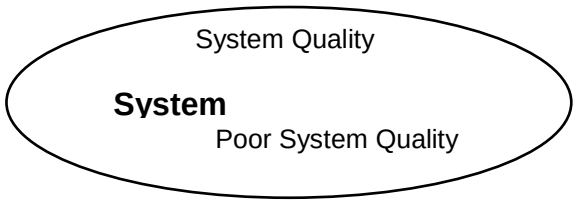

Figure 17 The System Category and its Concepts

5.2.3 Task

In general, a system is a set of functions which is designed to be used as a tool to perform requisite tasks. Tasks are required to use the systems that are implemented by the organisation to support activities and its business processes. Therefore, understanding the tasks is important for organisations in order to decide on the systems which are needed and required to support their employees. A more effective system would support a higher level of tasks directly related to the goals or functions of the organisation (Croft and

Lefkowitz, 1984). Task requirement can describe the organisational decision which is assigned to the use of the system in order to execute the task. In organisations, users are required to use the system as it is made for mandatory usage. When an incident or problem occurs, during or after the task process, the user looks for a quick and possible solution to cope with an unwelcome condition. The use of technology (e.g. IS, IT) to improve work practice is also determined as a mandatory system applied to the task process and procedure. Users perceive that the system is mandatory and must be used as part of organisation requirements and policy. Figure 18 displayed the task category with its concepts.

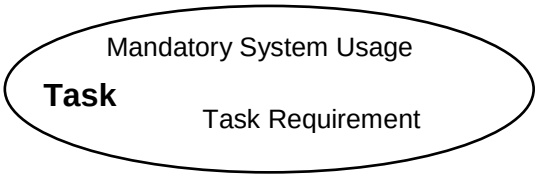

Figure 18 The Task Category and its Concepts

5.2.4 User

The user is always essential in any study on science and technology (Capel et al., 2005). In the context of ICT, the user plays a key role in the study: the examination, experimentation, evaluation, and exploration of the use and development of information systems and technology. Indeed, the user is an important subject in accessing and using the system. In Figure 19, user requirement reflect what users need from the system. In many cases, products or systems have been successfully made and used, but most likely there were failures because they were not suitable for certain tasks and objectives. As a result, understanding the user is one of the keys to evaluating the product requirements. The single most critical activity in developing a quality product is to understand who the users are and what they need (Beynon-Davies, 2002), since there are different types of users that must be carefully considered and selected to evaluate the requirements and definitions. With respect to accessibility, users must first gain the physical ability to access online information resources, which broadly means they must access computational systems (Pearlson and Saunders, 2006). Functionality specifies the system functions that each user will require for the different tasks that they perform (Maguire, 2001). Functional requirements may be expressed as services, tasks or functions the

system is required to perform (Malan and Bredemeyer, 1999). Resources and facilities are the organisational assets that should be provided as additional services and supports to users. In this way, organisational support is the significant factor for most users, although effective training is also the quickest way to accommodate user skills and knowledge. The effectiveness of training should be monitored at all times and specified as part of the user requirement's specification (Capel et al., 2005). In addition, a standard is needed to provide guidance on the product's usability for the requirements of office work and the extent to which a product can be used by specified users to achieve goals (Navalkar, 2008). Therefore, the user will gain benefits in terms of effectiveness, efficiency, and satisfaction in using the system (Jokela, Iivari, Matero and Karukka, 2003). Specifically, usability helps the product or system to be easy and more satisfying to use.

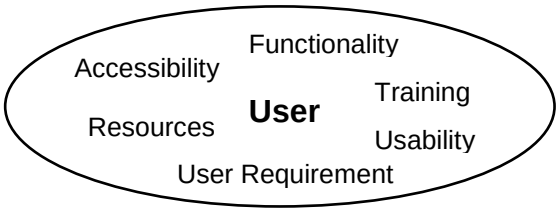

Figure 19 The User Category and its Concepts

5.2.5 Usage

During the focus groups and interviews, users expressed their feelings about their SAMS usage in the areas of system quality usability, accessibility, training, resources and facilities, and improvisation. However, poor systems quality was found to be the greatest concerns for most of the users. The effects of poor system quality forced users to adapt and manually use the system in order to complete their tasks. As a result, users employed workarounds in order to overcome the constraints of the system. Figure 20 displays the usage category and its concepts.

User adaptation is defined in Information Systems as the modifications made to a technology by users (Beaudry and Pinsonneault, 2005). Users adapt a system by adjusting and changing the process to make it easy for doing their tasks. Users adapt to this embodied theory, often changing their practices and situations of use to fit in with technology in both intended and unintended ways (Carroll, 2004). In other words users

find alternative ways to cope or deal with a technological problem and/or system constraints. The adaptation can be employed in a situation when users are experiencing difficulties or are unable to use the system as they expected. However, user adaptation may not be the optimal or best solution, but somehow it can help the user to overcome such problem situations until it can be permanently fixed. In addition, user adaptation is considered as the process of workarounds.

Generally, manually-based methods have been available for business and government operations for many years. Indeed, using manual methods is clearly accepted and employed, but since the introduction of information systems and technology into most organisations, manual methods are considered time-consuming, slow to process, and difficult to maintain, and therefore have been superseded. However, manual methods still exist in situations where the system and technology is unable or unreliable to work or process the tasks productively. In many cases, manual methods are used as the back-up plan and a procedure to support problem situations. Manual methods are also found to be more flexible to use and easy to modify to suit and closely match the task and operation required. For instance, a workaround may be used as the alternative method to perform the task and cope with a given problem. In this way, the user may bypass the procedure of the web service and directly use (direct access) a particular page. However, while using a workaround may not be the best solution, it does somehow help to find the possible way to discover the product requirements

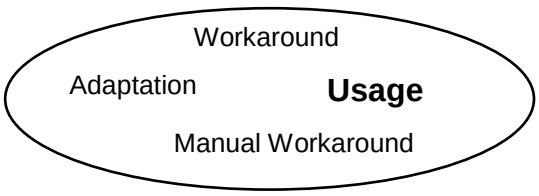

Figure 20 The Usage category and its concepts

5.3 Relationships between Concepts

Generally, relationships are statements about how the concepts are linked to form a theory. In order to explain the details of the concepts' relationships, this section looks at how these relationships and concepts relate to each other at AU and TU (e.g. see Figure

29). In this research, a symmetrical (two-way) relationship is used to demonstrate the two kinds of activity between the concepts, such as those relationships 'being made for' or 'being affected by'. In addition, it is important to note that the concepts and relationships of system usage are identified ith the aid of 'the matrix coding query' feature from the software application (NVivo) (see Chapter 3: Analysis tool; Appendix H). These processes are effected by specifying the nodes (concepts) and querying the comments between the nodes that are displayed in the columns and rows. The matrix function is useful for making comparisons within the scope of relationships. In this way, the comparative approach helps the study to discover and select the relationships between the concepts. However, these relationships need to be explored and examined in order to find the meaning of the link between the concepts. The NVivo tool just provides a quicker

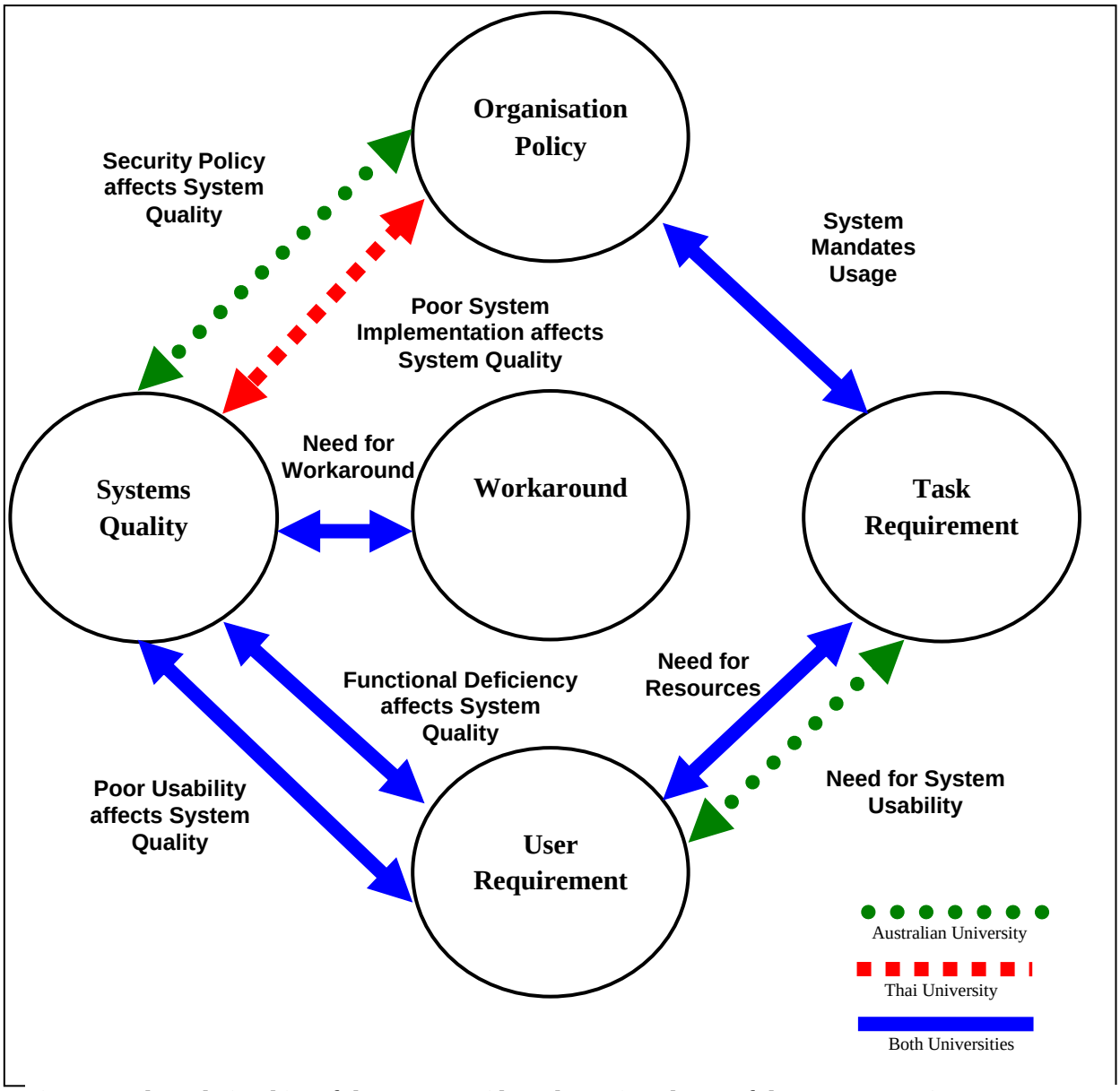

Figure 21 The Relationships of the Concepts (the Substantive Theory of the SAMS Usage)

way of identifying possible links between concepts. In the following figures (see Figures 21 – 29), the concepts are related through the categories and consequences of its relationships which are graphically presented as the results of the research theory. The following section also describes in detail how these concepts are connected. The following diagram provides an overview of the identified relationships between concepts. It should be noted that not all concepts were found to have axial relationships and therefore are not shown e.g. the concept of adaptation, manual workaround, and training. As well, not all relationships were found for both case studies.

5.3.1 Security Policy affects System Quality

In AU, the security policy impacts on the administrative users because their SAMS access has been limited due to the policy of protecting data access. However, the security policy does not affect academics and students because they do not depend on using SAMS for their information access needs. In AU, academics also have the option of using schools and their administration sections to support their requests for information. The security policy does not affect the IS manager because the manager already has the right to use the systems in order to support the users (students and staff). Therefore, the security policy only applies to the administrative users.

In TU, the SAMS quality is not impacted on by the security policy. SAMS access for staff (academics, administrative staff, IS manager) and students in TU is automatically given to them by the university. As a result, they all have access to the SAMS. Therefore, staff and students are not affected by the security policy unlike administrative users in AU.

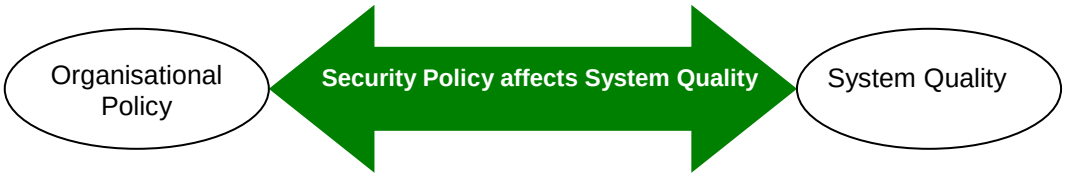

Figure 22 Relationship of the Organisational Policy and System Quality Concepts (AU)

However, the embedding of security policy in the SAMS by the university limits usage of the SAMS functionality. Staff were unable to access or conveniently use the functions as they were required to do. For example, an administrative staff reported that the security

policy has been limited by not allowing staff to access the information. Many of the system's functionalities have been restricted due to the new security policy.

> *When I started here, SAMS access was quite broad. You were able to look at many fields. Unfortunately, people manipulating data caused problems. Now, the access is restricted to certain users. Also, a lot of functionalities have been restricted and the others do not allow access to the SAMS.*

Another instance, the security policy does not accommodate users regarding usage of the system. This situation requires users to create manual workarounds and thereby reduce the quality of the system.

> *What happened though is that my access to the SAMS has been amended which means I now have to physically type out everyone's addresses, their names, DOB, and their contact phone number. As well as the current program they are doing, the program that they got the exemption from. To me that is a very time consuming and labour intensive task, where in the past, I was able to cut and paste function from SAMS directly in to an Excel worksheet.*

Users are limited by the security policy in accessing functionality which is caused by an unbalanced trade-off between the accessibility of functionality and level of security protection. The constraints on functionality have been applied to prevent users from accessing and using the system and its data in order to protect data sources from unauthorised data access, removal or destruction. Based on these statements, security policy highlights an important relationship between organisational policy and poor system quality.

5.3.2 Poor System Implementation affects System Quality

In this concept, the system implementation relates to the Thai University. In TU, many problems have been reported which relate to the poor system quality. The misfits of data, functionality, and output are the common problems of the SAMS. Moreover, other issues

such as accessibility, reliability, usability are also significant user concerns. According to effective system implementation, a well-structured plan and good project management is essential (Nah, Lau and Kuang, 2001). Furthermore, senior or top management support has been consistently shown to be fundamental to the implementation of a computer-based system (Sanders and Courtney, 1985). Consequently, system implementation strongly relates to organisational policy.

Figure 23 Relationship of the Organisational Policy and System Quality concepts (TU)

Moreover, there was the improper validation of testing plans during the SAMS implementation which led to many problems remaining in the system. Currently, the impacts of system implementation are affecting users. In TU, poor usability has persisted in the system usage. The use of manual workarounds remains because of system unreliability and organisational policy. The users still endure various problems such as data conversion, system processing errors, and system failure. For instance, according to one administrative staff member:

> *The problem started when the university implemented the system without checking every function of the system. When users needed to use the function such as to produce a report, instead of using it, we needed to adjust and test that again before it can be used.*

As well, the people (the project manager and team) who were responsible for the project were not qualified and neither did they have a competent understanding of system evaluation. Many problems arose when the systems were implemented. The IS manager explained that:

> *Yes, it is the processing of transcript results, because the calculating function of student grades is still making an error and lacks a cross-check subject function, because the students' data has been*

converted from our old database system. This problem has caused the impact to students as they cannot enrol and register.

Policy is informed by the experience of those who have to implement it (Australian Government, 2006). Therefore, the level of understanding of project management principles and their application can affect system implementation. The importance of this relationship demonstrates that the organisational policy affects the system quality.

5.3.3 System Mandates Usage

In this concept, the SAMS mandatory usage relates to all users in both universities. Staff and students perceive that SAMS is required for their tasks. However, academic staff and students may not be required to use the systems because they can access support from administrative personnel. While administrative users and the IS managers are mandated to use the system for their tasks, they do not have the option to do otherwise. Therefore, this concept strongly relates to the administrative users and the IS managers in both AU and TU.

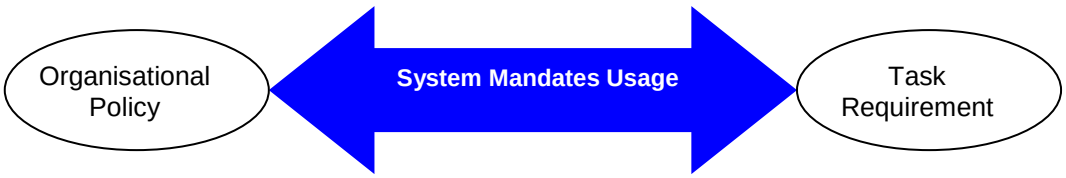

Figure 24 Relationship of the Organisational Policy and Task Requirement concepts (AU, TU)

One academic user remarked that she had to use the SAMS because it was mandated for doing a specific task. She explained that:

Yes, it is probably mandatory. When I was in the program director role, and so certainly the SAMS is mandatory really. You can't do the program director role without doing that. I supposed the ESS is mandatory too, because you can't apply for leave. I can't go and ask for that.

An IS manager also had to use the systems in order to help students and other staff, and this is also mandated by the university:

Why do I have to use it? Yes, I do not have a choice to use. We do not have any choice to use PeopleSoft (AMS, IEAMS) and enrolment online (EOL).

Students reported that they needed the system so that they could enrol. They also had to access and check their subjects, results and timetables. Students believed that SAMS is a compulsory system that must use:

No, we have to use online enrolment. They get us to use the online system.

As a result, SAMS helps users in different ways with a variety of objectives and requirements. Administrative staff and IS managers from both universities (AU and TU) have no option but to use them. In both universities, organisational policy significantly affects system usage because the policy forces the user to use the system to do the task. Consequently, these users do not have the option or freedom to do what they want but must conform and use the system. In this kind of workplace relationship, mandatory system usage relates to the concepts of organisational policy and task requirements.

5.3.4 Needs for Workaround

In AU, many academic users and administrative staff have created manual workarounds to overcome problems with their access to the system and specific functionality, for example with students' enrolments. The IS manager also reported that the SAMS did not have the functionality to support specific onshore programs. Students needed to enrol via a manual method. Similarly in TU, students often used the manual method to overcome system failures, for example academic users reported relying on the manual method due to system errors. This outcome was similar to administrative users who found the system was unreliable and unable to process the correct results. The IT manager agreed that the administration acknowledged students could enrol manually due to SAMS' functionality problem.

Figure 25 Relationship of the Workaround and System Quality concepts (AU, TU)

For example, a user employs manual workaround because the system cannot undo a task. An administrative staff member explained that she used manual workarounds to support students' enrolments, because the system did not allow students to withdraw from subjects due to the functional constraints:

> *Some of the students went to the lab as required by their program structure. Later, they did not want to do it. They wanted to drop out from it. The system would not let them do that. So, we had to use the enrolment variation to change that…we did it manually. Sometimes, students found difficulty with the online enrolment. They came to us to do the enrolment manually.*

System unreliability leads to manual workarounds. For instance, students reported that the SAMS often failed to serve and report their results. Therefore, they were unable to enrol for their subjects. One student stated that he used a manual workaround to process an enrolment due to system failure:

> *When I registered through the system, sometimes the system was not working or crashing. Also, sometimes the grading and scoring did not present or show on the system. Therefore, we needed to do it manually by contacting the registrar office.*

When analysing the text, manual workaround emerged as an alternative method in the university environment. Poor system quality strongly affects system usage where staff and students need to use manual workarounds to deal with such problems. Therefore, the manual workaround significantly relates to the concepts of workaround and system quality.

5.3.5 Functional Deficiency affects System Quality

Regarding functionality, the lack of it is very relevant to some user groups in both universities. For example, administrative users in AU reported that the SAMS lacked the functionality to support information searching. Another example is that the IS manager also reported that while the SAMS does not provide functionality for supporting the government training programs, but there is no report on the lack of functionality from academics and students. Instead, they discussed and focused on the functionality issues in terms of usability. Therefore, the concept of functional deficiency affects the administrative staff and the IS manager in AU. Concerning TU, the lack of functionality refers to administrative users. They found that SAMS lacked functionality and this was reported by the IS manager, who mentioned that the SAMS could not support credit transfers. At TU, furthermore, students reported that SAMS has no functionality to support them, e.g. searching function or acknowledging prerequisite subjects. As a result the lack of functionality strongly relates to all SAMS users in TU.

Figure 26 Relationship of the System Quality and User Requirement concepts (AU, TU)

For example, a user employs a manual workaround to process a report. However, the functional constraint will create an impact on users because they are likely to spend more time coping with the lack of functionality. One administrative user said that:

> *But SAMS does not have that functionality. It only gives you a certain way to identify the data and looking across the system. Ability to do that will help us because sometimes we have requests from the academics in the schools, saying that they need to know the report from the college; they need to know, what is the percentage rate of successful students in a certain program from this year to that year.*

Here, the lack of functionality was found to significantly impact on users as they were unable to complete their tasks. For instance, one staff member noted that he required the functionality to search for information in order to process a report:

> *If there is a facility where I am able to go into someone's account and maybe a tick box to identify and send that off, that will be great for me. But unfortunately, we don't have the interface yet to provide that function.*

In this relationship, the lack of functionality significantly impacts on the system usage because users need the system functions to do their jobs. In this way, functionality strongly relates to the concept of user requirements and system quality.

5.3.6 Poor Usability affects System Quality

Poor usability here relates to most of the users in AU. Their responses reflect the fact that users are more concerned with the usability concept, which in turn relates strongly to the complexity of SAMS. The results also indicate that in AU the concept of poor usability strongly relates to system usage. In TU the responses are different in regard to poor usability. The reports indicate that academic users and students are more concerned with system usability because they have less experience or involvement with the SAMS. The responses suggest that academic users and students are concerned about the usability of SAMS, while administrative staff and the IS manager are not focussed on usability because SAMS is part of their tasks. In TU, administrative users and the IS manager are involved with the system more than the other users. Subsequently, the poor usability concept is strongly evident in both universities.

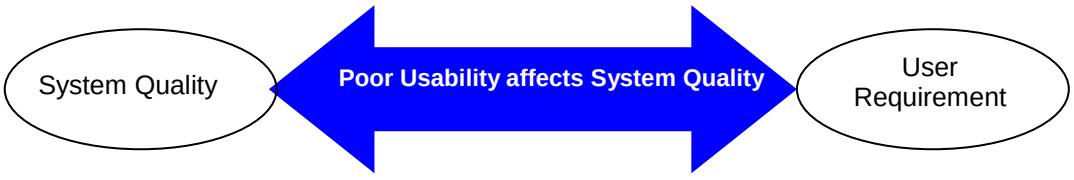

Figure 27 Relationship of the System Quality and User Requirement concepts (AU, TU)

For example, an administrative user reported that SAMS was difficult to use. The user perceived her frustration in that she could not operate the system to find the information she needed:

> *It is difficult to try work out how we can actually filter in to the SAMS mainframe to get that information. I found that out from what academics require from administrative staff. It is very hard for us to turn around and find that information.*

Staff mentioned the difficulty they had faced when attempting to retrieve data from the system. They found that the SAMS lacked a usability feature which made the system difficult and complicated to use. Poor usability emerged in one administrative staff member's experience, as she observed that:

> *Should the system accommodate what we do at an operation level and simplify things for us not complicate things for us? I think in an organisation as large as us, we are currently using so many different systems through our jobs to just complete our daily tasks. And I think "complicate" is a key word here, because that is exactly what we are doing. We are doing things in a complex way; we are not doing things in the simple way.*

As a result, lack of usability compromises system quality. Usability strongly affects system usage and poor system quality. In this relationship, usability relates to the concept of user requirements and system quality.

5.3.7 Need for System Usability

Usability is defined as a system or product being friendly and easy for people to use (ISO 9000, 2000). In AU, users find the system is difficult to use and also the system has no usability feature or it is unavailable. In the situation, many users found the system lacked usability and was too complicated to use. One administrative officer remarked:

Somehow, the system should be simpler, more user friendly and far more easy to use. There are too many options. There should be choice where you can use something simply or you can make it complicated. By clicking a button that gets you everything and easily allows you to load something, the respondent is not there.

Figure 28 Relationship of Task Requirement and User Requirement concepts (AU)

Another administrative person also finds the system is more complicated to use:

I also use SAP for staff information. I don't find the systems as an exceptionally user friendly system. To me it is quite complex. So, if I don't need to use it, I won't use it, because I actually need a lot of time.

In this relationship, usability is the significant factor which influences the requirements of users and tasks. An understanding of user requirements helps to minimise system complexity and improve the product's usability.

5.3.8 Need for Resources

It can be seen that the selected statements actually cover a variety of aspects of system usability, such as the need for support, training, and complexity (Brooke, 1996). In AU, the organisational resources relate to most users. For example, administrative staff reported that the university has limited SAMS usage by not providing training to users, yet academics and students reported that they did not receive enough information support when using the SAMS. Therefore, administrative support is an important alternative for them. Meanwhile at TU, support also relates to the administrative staff and academic staff. Most academics report that computer hardware is the problem for them, while, administrative users respond that information is important for them to support other users.

Like AU, furthermore, students usually receive support from administrative staff. As a result, the resources also relate to all SAMS users in AU and TU because the SAMS are complex. These users found that training should be available to them but it is not available to staff due to the new policy. An administrative staff member mentioned the lack of training here:

> *We aren't sure what exactly they have in mind but when you contact IT and say OK, we want this training, they say that training is not currently available, like the ESS training.*

> *The vendor has not provided the training to us anymore. Now, we have to learn to use it by ourselves.*

Figure 29 Relationship of Task Requirement and User Requirement concepts (AU and TU)

Meanwhile, an academic staff reported that the computer hardware and facilities were inadequate for them to process the student results. He also found that most of computers in the room were broken and unable to run. These ICT resources and IT/IS support were inadequate and often unavailable.

> *"Yes, it must be enough for the users. Here, we have the computers which aren't working. It is totally useless and sits there in the corner. When we reported it to the administrative support, it took such a long time for them to come and fix that computer. Even Internet access is taking a long time to setup too.*

In this instance, resources are limited or are lacking in providing the users' needs which are underestimated by the university. In this relationship, the lack of organisational resources significantly impacts on system usage.

5.4 Cross- Case Study Comparison (AU vs. TU)

The comparative approach studied the data from the users in AU and TU to identify the differences between these users in relation to the systems usage. The reason for comparing these users was to discover and understand the factors that may influence their SAMS usage. Initially, the researcher classified the users into groups according to their tasks and organisational positions. These users were early classified as academic staff, administrative staff, international student, local student, or IS/IT manager. In doing so, the researcher examined and selected the concepts that the user groups discussed and responded to in their focus groups and interviews. The researcher identified how the different conditions or courses happened in order to explain the relevant outcomes.

NVivo permitted the researcher to calculate the number of times a concept was mentioned, by counting the number of words from the data transcription of users, and calculating those into a percentage (see Appendix I). According to Rihoux and Ragin (2008), this technique is purely descriptive in that it makes the data more compact. The use of numbers helps to recognise the differences between the user's groups. In fact, Pace (2003) asserts that "statistical sampling is not required in a grounded theory study, either to discover concepts or to confirm their existence" (p. 84). Moreover, Zikmund and Babin (2007) also confirm that "qualitative is not about applying specific numbers to measure variables or using statistical procedures to numerically specify a relationships' strength" (p. 82). However, this research intentionally used these data (numbers) as information to inform and support the concepts which are selected for the comparisons. For example, a high number of mentions of the concept suggested that the users were more concerned or interested in that particular concept because they were frequently discussed. On the other hand, a low number or zero references indicated that the users were less interested or did not care about the concept. In this way, the researcher was able to make a comparative study possible. Using this approach, the researcher started with selecting concepts which had at least a 50 percent difference in the response data, in order to compare the users' groups (see Appendix J1- J6). Then the two sets of data were compared to see if there was an actual conceptual difference in the data sourced from the two different user groups or case studies. In this comparative approach, the researcher

began to explore and compare the universities (AU and TU) and this was followed by comparing the users. The summaries of all comparisons are presented in Appendix L 1.

5.4.1 All Users

Respondents' answers resulted in three conceptual differences emerging between AU and TU on the issue of SAMS usage. This was particularly the case in terms of workarounds, accessibility, and usability.

A. Workaround

In AU, the responses demonstrated that users adopted workarounds to cope with the problems caused by limitations such as functionality constraint, poor system usability, and compatibility issues. For instance, administrative users used external programs such as Crystal Report®, to query the database and access information because the SAMS lacked functionality to support this task. Some users created their own shortcuts to bypass the processes in order to access the functionality they needed. Meanwhile in TU, users employed workarounds in response to the problems encountered and these revolved mainly around the issues of functionality and system reliability. However, a few of the responses from TU reported that workarounds were less frequent, if not unlikely, given university procedures and policy. For example, most students relied on the services and support provided by administrative staff when they faced a problem or difficulty with the system, as in system failure or crash. As well, when such problems occurred, administrative staff were required to report the problem to the IS manager in accordance with university procedures. If the problem was found to be unmanageable, then the manager would report the situation to the registrar director for the authority to contact the vendor. Therefore, the workaround is not the ideal method for dealing with the problem at TU. At AU, conversely, people are more inclined to make their own choices. Equally, many users in AU are likely to create or employ system workarounds as their coping method.

B. Accessibility

In AU, more users were concerned with the accessibility issue than in TU. The responses indicated that users required access because the SAMS were important to their tasks. For example, students mentioned that they needed to enrol by using the system. Administrative staff, the IS manager and some academics also needed to use the SAMS to acquit their tasks. Moreover, there was a new management policy which applied to system access where many users were limited in their access to the SAMS for security reasons relating to data protection. Therefore the SAMS accessibility issue had a significant impact on most users in AU. However, at TU the accessibility issue did not affect users to the same degree as they had the option of using the university administration to support their tasks. However, students, academics, administrative staff and the IS manager in TU were among the users who were mandated by the policy to use the system. In this way, these users all had access to the SAMS. As a result, staff members and students in TU were not concerned and focussed on the accessibility issue, in comparison to staff members and students at AU.

C. Usability

In AU, the concept of usability referred to the concept of the user interface. The responses indicated that users were more concerned with usability when they perceived or encountered difficulties in using the systems. Most users reported that the SAMS are difficult to use because of poor design. They also found that the complexity of SAMS resulted from system integration, given that AU's systems consist of other applications. For instance, most of the users needed to use a different password to log-in and log-in twice or more to use the systems. Many users complained that it was difficult and confusing for them to remember these passwords. Some users reported that they needed to rely on a piece of paper or a notebook to remind them of these log-in passwords. Meanwhile in TU, some users reported that they were also concerned with the SAMS user interface. Their responses suggested that the menus and functions are complicated to use because of the interface design. These results suggested that users in AU and TU shared similar concerns about the usability concept. However, the responses in TU showed a lower level of concern than AU with the usability issue, as users found the

system easier to learn and use. Originally, the TU SAMS was implemented as a single system and was not connected or integrated to the legacy application or other systems. The results suggest that the SAMS in TU are less complex or less difficult for users to understand than in AU.

5.4.2 Administrative staff

The comparison of administrative users in AU and TU showed differences in the concepts relating to the effects of system usage (see Appendix L1). There were four concepts that exhibited significant differences: workaround, training, user requirement, and accessibility.

A Workaround

In AU, administrative users reported that they encountered problems with SAMS such as functionality constraints, poor usability and system failure. For example, an administrative staff developed a method to deal with the problem of inaccessibility to a specific function. Many staff employed manual methods by using a spreadsheet to support the creating and making of a report, student lists, etc. They also created workarounds to deal with problems such as system failure or unavailability. However, in TU there was a different response to using a workaround with one of the administrative users reporting that a manual workaround was the only method to handle a problem. In TU, the problem of information inconsistency or being not up-to-date was a problem that arose from errors in system processing. Most of the administrative users used manual methods as a workaround to process and check information errors against backup papers. In this respect, the responses may indicate that administrative users in TU did not perceive the creation of workarounds as the ideal method to deal with such problems, as these problems will be decided and managed by a university decision at the management level. In addition to the general differences users found with the concept of workarounds, administrative staff in the two case studies had additional differences specific to them.

B. Training

In AU, the concept of training was significantly different from how it was handled at TU. The results indicated that administrative users in AU were more concerned with issues of training support. For example, several users mentioned that training was inadequate due to a change in management policy by the university. Since the SAMS are difficult systems, users need more training to support how they operate the applications. On the other hand, in TU the responses indicated that users did not perceive the need for training since administrative users also worked as part of the support team for other users. Thus, they are more competent with the system than the other users. However, the responses suggested that training is still important to administrative users as they require training support from the vendor in terms of technical knowledge for updating and maintaining the SAMS. As a result, training is considered to be the important factor that impacts on system usage. In both universities, training is an important resource for the organisations as well as their staff members.

C. User Requirement

Regarding the concept of user requirements, there were different responses between both administrative user groups. In AU, administrative users explained that they were unable to support their task requirements because of SAMS inaccessibility, functionality deficiency and usability problems. For instance, some users mentioned the misalignment between the two SAMS systems. Although the initial system has been designed with much functionality, its functions are very complex and difficult for many users. On the other hand, the second system is a more intuitive design but lacks the functionality and features to support users. These functions are the design constraints of university management. Therefore, these limitations significantly conflicted and impacted on many users, especially administrative users who needed to access SAMS in accord with their tasks.

In TU the problems emanating from the system functionalities were due to the developer failing to identify and address the appropriate requirements during system implementation. Staff also mentioned that the university had not completely identified the

user requirements, and therefore poor system quality was caused by inadequate system implementation. The responses at AU indicated that administrative users were concerned with the concept of user requirements. Many users also complained about the issue of accessibility which is significantly affected by the security policy. By contrast, a few responses from TU indicated that administrative users were only concerned with, and interested in, the issue of system functionalities. However, the results also reflected that in both universities user requirements must be elicited (Barry and Laskey, 1999). According to the literature, it is important to establish and document the user requirements so that the process of designing the system itself is valid (Maguire and Bevan, 2002). Understanding the requirements provides insights into many possible solutions and allows a person to select and investigate the best solutions from the users' perspective (Courage and Baxter, 2005). Finally, both user requirements and system requirements are verified for completeness and consistency with each other and with user needs and domain constraints (Barry and Laskey, 1999).

D. Accessibility

There were different responses from each university with respect to the accessibility concept. In AU, administrative users reported that staff required access to SAMS in order to obtain information for their tasks. Although one user mentioned that some staff could access SAMS, new staff were excluded. Therefore, new administrative users were not able to support the other users, for instance students and academics. As a result, these users had to rely on other administrative staff that did have access. For instance, they created workarounds by using other staff accounts to access the system. However, this result impacted on administrative tasks in that their workloads increased. Therefore, accessibility is the significant issue in AU which relates to the university policy on access specifically (Jaeger, 2007). The literature suggests that control impositions occurred because there was little flexibility about when, whether, and how much control was exercised (Strong and Volkoff, 2010). Accordingly, access misfits occurred when the access requirements needed to perform the task were not met (Soh et al., 2000). Thus, conflict can occur between management policies (Lupu, Marriott, Sloman and Yialelis, 1996) and user requirements. At TU the system access for administrative users is an automatic log-on. However, staff members can only access and use the system which has

already been assigned with respect to what position users have. As a consequence, in TU, administrative users are less concerned with the accessibility issue than administrative users in AU.

5.4.3 Academic Staff

With respect to academic users in AU and TU, six conceptual differences were found, these being organisational policy, mandatory system usage, usability, workaround, resources and facilities, and functionality.

A. Organisational Policy

In AU, academic users reported that their SAMS usage was controlled by university policy and procedure. This refers to the fact that ICT use is a common reflection of institutional policies (Collis and Wende, 2002). For instance, academic users needed to apply for permission before they could make any change or update information in the SAM systems. As a result, academic users were more concerned with the policy issues because they needed to use the system, although this reason may not apply to all users because most academics in AU do not always depend on the SAMS to do their tasks. Indeed, these users can request support from the administration. Therefore, academics in AU have certain options regarding SAMS usage. In TU, academic users reported that they employed SAMS as this was directed by the university and its policies. Every academic user perceived SAMS to be compulsory for them because they were mandated for university tasks. This finding may suggest a difference between both universities, as academic users in TU do not have an option but need to use the system. In this way, the concept of organisational policy impacts more on academic users in TU more than those working at AU.

B. Mandatory System Usage

In TU, academic users reported that SAMS is mandatory. Every academic user also acknowledged that they must use SAMS to process students' grades and results. While some academic users agreed that the system is more useful and provides faster processing

than the traditional manual method, many academic users also mentioned difficulty of using SAMS. As a result, these academic users must work out, or work around, the problem in order to understand how to use the system more effectively. In AU, SAMS are not mandated for the academics' tasks. Most academics do not need to use SAMS for their tasks as they can manually process a student's results and pass it onto administrative staff for data entry. Thus both academic groups are different in terms of the mandatory nature of system usage. However, a few responses from academic users in TU indicate that these people were not concerned, or focussed, on this mandatory concept because they were already aware that SAMS was compulsory for their tasks. On the other hand, the academic users in AU were more interested in the concept because they still need to use the SAMS for other reasons, e.g. applying for leave, checking personal incomes, etc. As a result, the concept of mandatory system usage relates to the concept of organisational policy.

C. Usability

According to the responses, the concept of usability was found to be one of the differences between academic users in AU and TU. For instance, the lack of system usability has been noted by many academic users in AU. Some users complained about the functionality being difficult and complicated to use, e.g. the search function. In this sense, functionality itself can determine usability; as the functions provided do not match the task requirements, a system will not be usable (Goodwin, 1987). As well, most of the users explained that the main difficulty was due to the user interface. In AU, system usability is also a SAMS issue that needed to be addressed according to the academics. In TU, academic staff also reported the SAMS' interfaces were complicated and they also mentioned another problem, that of system usability relating to the poor documentation of the user manual. They explained that most of the information in the manual was incorrect and/or inconsistent with the menus and functions. Therefore, the usability problem was influenced by poor documentation. In this comparison, the responses indicated that academic users in AU were more concerned with the usability issue than academics in TU. In AU, usability related to the functionality and user interface issue. Fundamentally, the user interface represents the characteristics of system usability.

Meanwhile in TU, usability is related to the user interface. However, poor usability of the documentation also affected the system quality.

D. Workaround

In this comparison, a few responses showed that academic users in AU were less concerned with the workaround concept than in TU. However, some academic staff mentioned that they were using manual workarounds for certain tasks and procedures. For example, an academic processed the student results and filled in the spreadsheet form, which was then passed through to administrative staff in the school to enter the information onto SAMS. This reason also indicated that academic staff in AU do not strongly relate to SAMS usage in comparison to the other user groups, as the SAMS is not mandated and authorised for academic staff. In TU, SAMS usage is mandated for academics. Many users reported that the SAMS had no functionality to support their tasks. For instance, many users struggled to find out the number and the names of students who enrolled in their class. Therefore, some users developed workarounds to cope with the system limitation such as the functional constraint. They adapted and extended use of the SAMS functionality to make the system adjustable for processing classes and timetables. Consequently, academic users in TU needed workarounds because there was inadequate support from the university.

E. Resources

In TU, the problem of inadequate resources has been reported by academic staff. Many academics complained that there were not enough supports such as hardware and internet facilities provided for their usage. Consequently, the lack of resources impacted on the academic tasks because these users could not process and transfer the results to the registrar. They had to spend time queuing and waiting for available computers. This problem also indicated that the resources and facilities in TU were not arranged and prepared to meet the demand or requirement when the SAMS was implemented. According to the responses obtained, most academic staff in TU were more concerned with the resources issue. In AU, the responses indicated that academics were less concerned with the resources and facilities issues, because the users received more

facilities and support from the university and had more positive experiences with respect to these resources and facilities. The results indicated that AU has better infrastructure for SAMS usage than what TU has.

F. Functionality

In AU, some academics mentioned that the SAMS' functionalities lacked the usability to assist people. For example, one academic reported that the systems were unable to provide the necessary information, such as having a poor search function which led to user confusion. As the result, most of the users had to search for information in different places. They mentioned that quite often users could not find the information they needed. In TU, academic users reported the problem of SAMS functionality caused by poor system design. They found that the details in database systems were also difficult to understand. Many academics found the functionalities were incompatible with the databases. Judging by the comparison, the problem of functionality in AU was a significant issue that related to the lack of usability, while in TU, the functionality and database were issues arising from the system design. However, the results suggested that academic users in TU were more concerned with the functionality issue, because there is no effective support from the university. In contrast the academics in AU showed less concern in their responses as they can request support from the administrative staff.

5.4.4 International Students

In the comparison between international students in AU and TU, the concepts of resources, system quality, and training resulted in different findings (see Appendix J 4, L 1).

A. Resources

In TU, students were not concerned with, nor focussed on, the need for resources. This reason is consistent with the support that the university provided to students. Therefore, international students in TU did not perceive the need for resources and facilities associated with system usage. In AU, international students mentioned the lack of information support for enrolments. Many international students complained that in this

circumstance, they could not receive enough support from the university services as well as from the SAMS. The responses also indicated that the SAMS lacked the information to support students such as classroom, timetable, calendar, etc. As a result, the students in AU were more concerned with the concept of resources, this finding being very different from the students at TU.

B. Good System Quality

In TU, international students discussed the usefulness of the SAMS usage. They mentioned that the system is more effective to use than the manual process. Most of the students found the SAMS helped them to reduce the processes and the procedures of their enrolment. For example, students do not need signatures from their academics or teachers for the enrolment applications. Consequently, the system processing is much faster than using the manual process. Therefore, international students in TU perceive more benefit from using the system. Meanwhile in AU, the students mentioned the poor system quality. Their comments suggested that international students were not satisfied with the system because many students complained that the SAMS was difficult to operate. Also, these students did not perceive, nor were concerned with, the system quality because the SAMS had not provided enough information as a resource to support them.

C. Training

In TU, international students reported that they were able to use the system without the need to attend training sessions. They found that enrolling was easy for them and the university did provide particular support for this activity. Therefore, the finding indicated that students in TU were less concerned with the training concept which did have a relationship with the level of university support. In AU, students expressed their concerns for the problem of usability. They suggested that the training should be more flexible and easier to access. The combination of such video training and online support would be appropriate to support student learning. The response from international students in AU indicated that training is needed for them which also reflected the complexity of SAMS. In this regard, the responses indicated that the SAMS in AU is more complex than in TU. Consequently, the training concept has raised the question in this study as to whether

these students have been given proper training. According to the size of the student population, this formal training task may be too difficult to arrange and conduct in the university. Both formal and informal training influenced the extent to which users had learned (and thus understood) the system, which in turn impacted on how well they used the system.

5.4.5 Local Students

The findings from local students indicated differences between the students in AU and TU, with reference to the concepts of usability, functionality and training.

A. Usability

In AU, the concept of usability was found to be most frequently mentioned by local students (See Appendix J5, K). However, there were mixed reports regarding the usability concept. For instance, in a positive report, some students commented that they were satisfied with the system given that recent improvements had been made to the student portal. Local students in AU found that the system was easier to use than the previous version. In a negative report, many local students commented that the SAMS was still difficult for them to use. They mentioned that the design of user interfaces has created more confusion. Therefore, these students were more concerned with the issue of usability. In TU, there were both positive and negative results; a 'bag' of mixed responses. For example, some local students reported that the SAMS lacked usability because the interface was too complicated to use. Many students mentioned that there was too much information placed onto the system interfaces which led to confusion. However, some students also positively responded in that the SAMS was easy and convenient for them to use, although the different responses may suggest both user groups are different. In fact, the reports explained that both student groups have similar concerns and perceptions with respect to usability.

B. Functionality

In AU, local students discussed the design of SAMS's functionalities in terms of their complexity. For example, some students believed that the functionalities should be combined into a single system. They found that when using different functions users were required to log-in separately. Therefore, in order to access these functions students needed to remember their log-in names and passwords. Local students in AU perceived the functionality in terms of the usability concept. Meanwhile in TU, local students reported the SAMS's functionalities were affected by the system design. Many students complained that the SAMS lacked the function to inform them about subject enrolment requirements. For instance, the system is not able to identify the prerequisites for subject enrolments. However, there were a few responses from the students which suggested that students were more reliant on administrative support. Therefore, in the functionality concept, local students in AU are more concerned with the usability issue whereas in TU students were focussed on the lack of functionality.

C. Training

The concept of resources led to different outcomes for both universities' local student groups. In AU, students reported that training would be required for new students to support their enrolments. However, they suggested that training would be useful for them as well as the documents which should explain the enrolment procedures. The responses also suggested that students wanted more support than just training, because most students understood that training would take time and they did not want to spend more time on it. In fact, this response was similar to that for international students. Therefore, students tended to prefer using supports and user guides. In TU, there was no response to this concept from local students and this may be for two reasons. First, students have no concern or interest in the training because they can obtain support from administrative staff. Second, the SAMS in TU is understandable to students. However, in contrast, the reports suggested that both local student groups did not perceive formal training would impact on their SAMS usage.

5.4.6 IT/IS Managers

The findings indicated differences between the IS managers in the matter of system usage. In TU, no finding was reported by the IS manager on the usability concept but nonetheless the functionality concept did highlight a difference between the two universities' IS managers.

A. Usability

With respect to the concept of usability, the IS manager at AU agreed that SAMS were complicated for users. For instance, the student enrolment system is a complex system because the way the system was designed, and the fact that school programs and courses were very different. The resultant complexity has impacted on the support team and system usability. In order to improve the latter, the support team has to provide necessary information to students and therefore they have to understand every school's courses and programs. The priority for the system support team is to minimise the complexity of SAMS. In TU, there was no response to the usability concept from the IS manager. Neither was there feedback concerning the usability problem and this may be for two reasons. First, in TU the SAMS may be less complex than in AU. Second, the outcome may also indicate that the IS manager in TU does not perceive usability as a significant factor affecting SAMS usage.

B. Functionality

In AU, the IS manager reported that the IS manager was concerned and understood that SAMS's functionalities needed improved usability for the users. For instance, the IS manager mentioned about many students were unable to understand how to use the enrolment system. She explained that students also did not know when the enrolment process was completed. Complex functionality, data complexity, and the complexity of learning about these systems all affect usability (Baecker, Booth, Jovicic, McGrenere and Moore, 2000). In TU, the IS manager reported that SAMS had no functionality to support the users. For example, the system has no functionality to process credit transfers and subject exemptions. Furthermore, it also lacks the functionality to check for prerequisite

subjects in the student enrolments. This problem also impacted the administrative task as administrative users had to manually process these credit results for every school. In contrast, usability was the important issue for the IS manager in AU, while the IS manager in TU was more concerned with the lack of functionality. The responses may suggest that in AU, the SAMS are more complex and difficult to use than in TU, while in TU, the system is relatively less complex when compared to AU.

From a comparative discussion of the concepts (see Appendix L1) as they affect both universities, there are those factors that need to be considered for SAMS usage in the university sector. However, it is evident that more similarities than differences emerge. In fact, the differences only suggest that significant factors relate to the system usage.

5.5 The Comparison between International and Local Students

Several studies have suggested that comparing responses of international and local students is considered crucial in higher education institutions. Universities need to be aware of students' needs and expectations, and take steps to identify, measure, meet and exceed those expectations which are under their control (Sherry, Bhat, Beaver and Ling, 2004). These results may suggest and reflect the type of SAMS that these students (local and international) operate with, and furthermore the nature of support that universities should deliver. In this section, the researcher compares the responses (comments) of international students with local students in their perceptions of SAMS usage (see Appendix K and L 2). The goal is to understand the differences between both student groups at AU and TU.

5.5.1 AU: International Students vs. Local Students

Corresponding with the findings, international students and local students were reported as having a few differences. For instance, international students at AU were concerned with the concept of user requirements which was different to the local student group.

However, international students had their experiences with problems of usability and poor system quality which were reported to be similar to those of local students. In fact, international students were more likely than local students to indicate that student information was inadequate. Consequently, the need for requirements such as student support, information support, and self-training are required to satisfy international students. International and local students were also interested in the system functionality. Thus, these results suggested that both user groups had similar perceptions of the issues of poor system quality as SAMS was difficult to use and failed to meet their needs. In AU, both student groups wanted online information or self-training support. Based on the evidence that in AU, international and local students together shared the class-rooms and the facilities e.g. computers, library, and etc. in doing their works and studies. In this way, both user groups may have similar experiences and perceptions with the system.

5.5.2 TU: International Students vs. Local Students

In this comparison, similar concepts were found in the responses of international and local students in the concepts of poor system quality, functionality, system quality, usability, and user requirements. These concepts echoed the most concerns of local and international students toward the system. However, only one of these concepts noted by the local student group most differed from the international student group. The findings reported that local students were more concerned with the issue of resources. At TU, it was suggested that local students required more support when compared to international students because local students did not receive the same level of support from the university as international students. For instance, first year international students do not need to enrol in subjects by themselves as the university provided this service for them. Moreover, local students also required the resources such as computers and high-speed internet because of the poor quality of these facilities. It is notable that at TU, international students have their own college and facilities which clearly separate them from local students. As a result, local students may have different perceptions with their SAMS usage when compare to international students.

5.6 The Research Questions Findings

The findings from AU and TU demonstrated that the SAMS usage is influenced by various factors concerning the organisations. They are discussed next in the context of the research questions.

5.6.1 Research Question 1: How are SAMS being used by the users for doing requisite tasks?

Judging by the comments on poor system quality, AU and TU users employ workarounds to handle such problems or constraints to get what they need when the systems fail or are unable to respond. In both universities, users are familiar with adaptation and manual workaround strategies in different circumstances (see Table 33) and these are described in the details below.

A. Workaround

There is much literature that describes workarounds as useful methods to overcome IS-related constraints or problems in organisations. At a glance, workarounds present an opportunity to analyse and learn from the situation to create more effective processes (Lalley and Malloch, 2010). For instance, a workaround strategy allows hospital employees to create ideas for improving their Electronic Health Record System (EHR). In one IS study concerning Electronic Medical Record System Implementation (EMRS) by Safadi and Faraj (2010), workaround emerges as a new and non-traditional communication channel of feedback between users and the system developer. Thus, the workaround recaptures users' needs and reactions to the system (Safadi and Faraj, 2010), since problems are the key to the individual user's using the creativity of workarounds (Norman, 2008). Petrides et al. (2004) add that the clusters of workarounds could suggest promising areas of attention as the creative works toward improving its information system. As well, "workarounds are the sole productive innovation and solutions" (Norman, 2008), including personalised adaptations such as 'hacks', 'macros', and a plethora of 'add-ons' (Ciborra, 1996). Furthermore, "workarounds offer a 'blueprint' for identifying the pressing information gaps that need to be resolved when considering improvements in an IS and the people who are involved and responsible in making

decisions concerning such an implementation" (Petrides et al., 2004). Moreover, workaround may be applied to reveal the existing gaps or problems regarding the IS/IT design and implementation in organisations. Therefore, workarounds need to be considered as constitutive elements of working infrastructures (Gasparas and Monteiro, 2009), since they could impact both the organisational and individual levels.

In this research, the system constraints affect users. They are unable to use the systems as they are currently designed to execute their tasks. The use of workarounds has been created in order to bypass the problems of SAMS, e.g. access misfits, design misfits, and functionality misfits. However, users perceived that the workaround is not encouraged and is unwelcome when SAMS are already mandated in both universities. As a result, universities do not fully understand the potential benefit of using the workaround. In this way, therefore, universities as higher education organisations need to better understand SAMS usage in order to encourage and support the users.

In AU, academic staff members reported that the lack of functionality affected their tasks. One staff member explained that she could not access the system in order to retrieve information. She found that using a simple spreadsheet allows her to collect and organise the information. Furthermore at AU, academic users found that the system does not have the functionality to support their tasks. An academic user explained that she had to devise a workaround in order to find the information from the system. In the school administration, an officer reported that they needed to work around the system by creating a shadow system, in other words an interface for direct access to a particular database. In the case of international students, compatibility also impacted on the users when they accessed the system. With the problem of compatibility issues, students need to work around by using an alternative platform application to access and use the system. However, local students reported that they found the incompatibility issue was similar to that experienced by international students.

In TU, users used workarounds to overcome poor systems quality. An academic user reported that the system cannot control and limit the number of students enrolled in a class. Users utilised the workaround by filling in the students' results which forced the system to close and reschedule the class so that the number of students was correct. In the university system reliability is also affected by the users, as administrative staff report that they employ manual workarounds to reduce the system workload and failure, for

example when many students submit their enrolments all at the same time. Therefore, users employ workarounds to compensate and bypass the problems or constraints in the systems.

Group of participants	Key perception
Academic staff (AU)	Users employ Workaround as the functionality constraint.
Administrative staff (AU)	Users create Workaround to support their accessibility.
International student (AU)	Users apply Workaround for compatibility problems.
Local student (AU)	Users apply Workaround for compatibility problems.
Academic staff (TU)	Users create Workaround to support the system constraint.
Administrative staff (TU)	Users employ Workaround to circumvent the system failure.

Table 33 Summary of users' comments on the concept of Workaround (AU and TU)

B. Adaptation

In this research study, users adapt the system to their own ends because they are aware that the systems are not effective. Users alter the functions and procedures required for their tasks. Table 34 reported the summary of users' comments describing the concept of Adaptation in AU and TU.

In AU, academic staff found that sometimes a specific function is hard to find. Therefore, the user creates a shortcut to make the system easier to access. The limitation of the system's design has affected the user as he or she needs to alter the usage for a given task. In the university administration, users reported that they adapt the system when it is not suitable to their tasks. At TU, academic staff found a problem concerning system function involving the failure to prevent students over-enrolling for classes and subjects. Staff needed to amend the classes and timetables before they could generate the timetable reports. An administrative staff member reports that the problem is with the database which converts and migrates data from another campus, in which case they need to make amendments by adjusting the results and subject codes which differ from the current database system.

Group of participants	Key perception
Academic staff (AU)	Users adapt the function to process the information because the system is difficult to use.

Administrative staff (AU)	Users adapt to use different processes to support their tasks.
Academic staff (TU)	Users need to adapt and change how they use the system.
Administrative staff (TU)	Users adapt to use the system due to errors in database conversion.

Table 34 Summary of users' comments describing the concept of Adaptation in AU and TU

C. Manual Workaround

According to similar results about the poor quality of systems, users find ways of using them with workarounds and adaptive methods to overcome dilemmas. However, this research study also found that manual processes, such as paper–based methods, were still employed in parallel with the electronic systems. The summary of users' comments describing the Manual Workaround in AU and TU was reported in Table 35.

In AU, administrative users explained that SAMS is designed and used for administrative tasks. However, manual and paper–based methods are still important for official statements like academic records and references. Another problem with SAMS is system reliability, as the system is not always up-to-date and constantly crashes during data entry. Therefore, staffs refer to the manual method as alternative back-up strategy International students also reported that as the university's enrolment procedure, first year students must enrol by using the manual or paper-based form. The IS manager confirmed that when problems occur with the system, students can use a manual method for enrolments.

While at TU, a manual or paper-based form is used as the alternative or back-up procedure. Academic staff reported that to prevent problems or unreliable outputs from system processing, staff are still required to have a paper-based format. Manual processes constitute the alternative as a back-up or reference. This method is also provided to validate students' grades and results. In TU, international students are able to use the manual process when the system is unavailable or breaks down. A similar problem is also found with local students, as a student mentioned that the system often fails or crashes. Therefore, students must use the paper-based form for their enrolments. Moreover, given the system functional constraint, the IS manager also agreed that the manual process is needed and important for staff and students. In this research, the manual workaround is the alternative method and its typical of university practice in this research.

Group of participants	Key perception
Administrative staff (AU)	Manual process is used and required to support the organisation.
International student (AU)	Students use manual process for their enrolments as directed by university policy.
IS manager (AU)	Manual process is the choice when the system becomes unavailable.
Academic staff (TU)	Manual process is used as the back-up source and supporting material.
Administrative staff (TU)	The results need to be validated by using the hard copy documents.
International student (TU)	Manual process is the alternative method to support users when the system crashes.
Local student (TU)	Manual process is used for enrolments and this is similar to the process for international students.
IS manager (TU)	Manual process is employed to bypass the system constraints.

Table 35 Summary of users' comments describing the Manual Workaround in AU and TU

5.6.2 Research Question 2: What are the effects of the SAMS Usage in the universities?

In both universities there were implications for the cause and effect of SAMS in the universities. These are described in more detail below.

A. Organisation Policy

Organisation policy describes how management direction and decisions that apply to all staff members and others are directly associated with the organisation. Generally, policy refers to the rules of an organisation regarding its power, interests, and objectives. For instance, when organisational objectives have been established, policies would be provided as a guide to the way they will be achieved (Lucey, 2005). In the case of a university, SAMS are managed and controlled by a number of policies which sustain a set of procedures for staff, students, and other members. In other words the university

regulates the use of SAMS as the result of organisational policy. Certain information is limited to the system usage environments because of security procedures regarding errors, losses, and modifications of data and other information. The mechanisms used to enforce this protection, including password, user interface, functionality constraints, and access constraints, reflect a design 'blueprint' as chosen by the university. However, these intermediate policies relating to ICT can be based on increasing the efficiency of operations, improving the quality of teaching and learning, enhancing the flexibility of educational services and cost-related pay-offs, and increasing access opportunities options for students (Collis and Wende, 2002), and staff members. Therefore, that ICT use is common simply reflects the policies of universities (Collis and Wende, 2002). The comments reported in Table 36 show the summary of users' key perception describing the concept of Organisational policy in AU and TU.

In AU, the organisational control policies apply to the academic group, and one academic reported that the university wants to prevent the problem of data manipulation by unauthorised users. The restrictions have also impacted on administrative tasks, as staff found that they were unable to use the functions to access the information as they used to do before the new policy was implemented. There is also the system procedure that impacts on international students. According to the enrolment policy, international students complained that they could not do online enrolments. They had to enrol manually which means doing them at the student administration branch. The restriction of information access was confirmed by the IS manager who explained that the university wants to limit users from using the AMS. As a result, new staff can only use the IEAMS system.

In TU, academic users found that the changing of policy and procedures has created confusion and impacted adversely on their work processes, because the university failed to make users understand how important this change was to the university. International students reported that the SAMS limited their usage time. The restriction affected students as they felt uncomfortable using the system. As a result, many students went to the administration section and enrolled manually. Consequently, this affected administrative staff as their workloads increased because they were needed to support the students. The IS manager reported that the university wants to improve the capacity of administrative operations. The results also indicate that most users want SAMS to be

changed or improved. Clearly, the organisational policy affected the system usage. The control policies were applied in the areas of system design, information management, and support. However, these outcomes also reflect the influence of the organisation which controls the use of SAMS.

Group of participants	Key perception
Academic staff (AU)	Security policy affects user accessibility and task.
Administrative staff (AU)	Users are unable to access and use the function due to the policy restriction.
International student (AU)	Students cannot use the system for their first enrolments.
Local student (AU)	Security policy affects users' accessibility.
IS manager (AU)	The system usage is directed by organisational policy.
Academic staff (TU)	The policies create complications for the users and their tasks.
Administrative staff (TU)	The policies impact on tasks by creating a greater workload.
International student (TU)	The system has limited the students' usage time.
IT manager (TU)	The system usage is directed and impacted by organisational policy.

Table 36 Summary of users' key perception describing the concept of Organisational policy in AU and TU

B. Poor Systems Quality

There are many issues that influence the system's effectiveness and quality, for example, poor system quality emanates from poor system design and related development. Also, the software application is unable to function and deliver according to usage requirements. In AU, the impact of system access was explained from the academics' viewpoints. The SAMS were not easy to access because of the design and control procedures. Quite often, users found the system was complicated when accessing the system and resetting the password. Administrative staff also found that they were unable to access and use the function due to the misfit of functionality. For instance, one administrative staff mentions that she was unable to get the required information from the system. International students also reported that the user interface design was complicated to use. A student suggested that the system interface lacked usability. Local students also reported that they could not perform their information searching, as they found the search function was inconsistent with the user interface. However, the IS manager reported that the ineffectiveness of the system was dependent on the users' perception of how to use the

system, rather than the system itself. The comments listed in Table 37 showed the summary of users' key perception describing the concept of Poor System Quality in AU and TU.

In TU, the system quality affected system usage. One of the academic staff mentioned that the reliability of SAMS was quite low as the system often failed to run and was unavailable. Administrative staff found that poor system quality was the result of system design and implementation. There were the functional misfits from the system which impacted the users. International students found that the system was often unreliable and unavailable. Therefore, they were using the manual process instead. In TU, poor user interface of SAMS impacted system usage. Local students mentioned that the system was complicated to use as they could not locate the payment system. The IS manager reported the problem with system functionality may affect the system usage. The manager also stated that the organisational policies influenced the system design which led to these problems such as functional misfit. As a result, in TU, users perceived poor system quality because the SAMS was influenced by university which affected their systems usage.

Group of participants	Key perception
Academic staff (AU)	Poor system quality caused by system design and integration.
Administrative staff (AU)	The system functionality is complicated to use.
International student (AU)	Poor system design affects the system quality.
Local student (AU)	Ineffective functionality impacts on the system quality.
Academic staff (TU)	Inadequate support, poor system quality and lack of user requirements impact on the system usage.
Administrative staff (TU)	Poor system implementation affects the system quality.
International student (TU)	Poor system quality impacts on the system usage.
Local student (TU)	Poor system functionality affects the system quality.
IT manager (TU)	Ineffectiveness of functional design affects the quality product.

Table 37 Summary of users' key perception describing the concept of Poor System Quality in AU and TU

C. Task Requirement

Organisational management can influence the use of ICT by forcing professionalisation in ICT competencies, using financial incentives, and making ICT mandatory in education

(Collis and Wende, 2002). This implies policy setting which determines the use of IS or IT in order for users to complete their tasks. It means that the system becomes an important facet of the requirements for a user. The comments reported in Table 38 show the summary of users' key perception describing the concept of Task Requirement in AU and TU.

According to AU, system usage is determined by the policy and procedures mandating SAMS usage for requisite tasks. One academic indicated that he used the system in order to make decisions about students' applications. The systems were needed for this task and the user was responsible for it. An administrative staff member explained that the university did not provide the privileges and permissions to them so that they could use the systems. In AU, the enrolment policy impacts on the students but unfortunately creates user frustration. For example, students cannot use the online enrolment process for their first enrolments. A student complained that she was unable to enrol on time because she was overseas. Local students also perceived that the policy impacted on their enrolments. According to the university's policy, students must only use the system for enrolments. In AU, the IS manager reported that SAMS is required for the task since the system is mandatory and directed by university policy. Staff needed the SAM systems to do their jobs.

Group of participants	Key perception
Academic staff (AU)	Users require the system for their tasks.
Administrative staff (AU)	As the system is needed for the tasks, staff perceive that it does impact on accessibility, which has not been provided to them.
IS manager (AU)	User requires access to the information from the system.
Academic staff (TU)	The system is required for the task.
Administrative staff (TU)	The necessary documents should be contained in the system.
International student (TU)	User requires access to the information from the system.
Local student (TU)	The system is required for processing the task.
IT manager (TU)	Users required the system to do their tasks.

Table 38 Summary of users' key perception on Task Requirement in AU and TU

At TU, SAMS is also important for user tasks as the system is mandated by university policy. In this context TU is very similar to AU, as administrative users expressed the view that the system is important to their tasks. They used it to prepare forms and reports

for the students. The reports from international students in AU and TU are also found to be similar regarding the concept of task requirements. According to university policy, the new students are required to use the manual process for their first enrolments. In TU, local students were also aware about the requirement of using SAMS for their registrations. The IS manager reported that the system was important for users and their tasks. As a result, SAMS usage is directed by the university which mandates it for important tasks.

D. User Requirement

ISO 13407 describes user requirements as how a future product can help users achieve the goals effectively, efficiently, and satisfactorily in their contextual environments (Coble, Karat and Kahn, 1997). Similarly, user requirements refer to the features or attributes the product should have or how it should perform from the users' perspective (Kujala, Kauppinen and Rekola, 2001, ISO, 1999). It therefore reflects what users need from the system. Moreover, these requirements describe any functions, constraints, or other property that must be provided to satisfy users' needs (Courage and Baxter, 2005).

In traditional software development practices, the understanding of users and tasks being supported is generally assumed to be captured in a statement of requirements on which both customer and developer agree, and necessary for systems to be developed successfully (Leite and Freeman, 2002, Chung and do Prado Leite, 2009). For instance, a large number of information systems development projects can be classified as either complete or partial failures because they are either excessively over-budget, months or years behind schedule, poor quality, or simply because they fail adequately to satisfy users' requirements (Doherty and King, 1998, May, 1998). Requirements will appear to fluctuate when the development team lacks application knowledge and performs an incomplete analysis of the requirements (Curtis et al., 1988).

In such a customer–developer environment, reaching and maintaining a common understanding of user requirements is necessary for systems to be developed successfully (Coble et al., 1997). Gunter et al. (2000) state that "requirements indicate what the customers need from the system in terms of its effect on the environment". Hammer, Leichtenstern and André (2010) conclude that "the users' knowledge, needs and

requirements are the most important factors that decide the success or failure of services and products". Therefore, user requirement needs to be documented and represented in an effective guide that accompanies the IS usage in organisations. In this research, user requirements are the responses of the system usage where users describe problem situations, constraints and needs. Many users were unable to use the systems to do what they wanted because of the poor understanding of user requirements and organisational supports. Moreover, user requirement refers to the feedback which responds to the needs of system usage. In such a customer–developer environment, reaching and maintaining a common understanding of requirements is necessary for systems to be developed successfully (Coble et al., 1997). However, identifying the requirements is often difficult to do. In this situation, the inadequacy of the functionality and usability compromised system usage badly. The lack of user requirements affected system quality. The comments captured in Table 39 report the summary of users' key perception describing the concept of User Requirement in AU and TU.

At AU, many academic users mentioned that the system was difficult to use. Users reported that SAMS was more complicated than necessary and they could understand the functions. The lack of usability has been mentioned by one academic user. In AU, the lack of functionality was reported by administrative users. They explained that users were unable to access and search for the information they needed. The system had no function to support this particular task. One of the administrative staff personnel noted that the function would help to find the information and process the reports more efficiently. In terms of user support, training is significant to the user because one international student expressed the view that they required training to understand how to process enrolments and payments. Students experienced difficulty when using the system to check and select subjects. Therefore, training should be more effective in supporting them to use the system. A local student mentioned that the system should be integrated into a single application as that would be easier for the user to manage their information usage. The IS manager also suggested that the system should have the function of responding to and supporting users. The lack of system support for understanding the task processes was identified.

In TU, an academic found that database fields and tables from the system were missing, and these were vital for entering information into databases. Academic staff suggested

that improving the existing design was important for them. Administrative staff also requested specific training in the technical and development areas. This training would help them to contribute and support any amendments and developments more effectively. An international student said that the student system was not effectively designed and was in fact disorganised. They found the user interface is complicated for finding information. A local student suggested that the system should include functionality to support all students. The system must be able to acknowledge students when something relates to the problem or when a change in student status occurs. Students want the system to be integrated more easily so that they can organise and use it. The IS manager also reported that government policy has an impact here in terms of regulations. The university required a new system that can respond to and support government legislative requirements.

When discussing this particular concept, the user requirement is the most significant factor of system quality. In this research, most of the problems relate more to functionality and usability. For instance, functionality and usability are both task-related and people-related, and the functions need to match task requirements and people's needs (Scott, 2008). As a result, the lack of user requirements also impacts on the system usage.

Group of participants	Key perception
Academic staff (AU)	The system usability requires improvement for usage.
Administrative staff (AU)	Limitation of the system access impacts on user task.
International student (AU)	Training is required in order to understand how the system is used for the task.
Local student (AU)	The systems should be integrated for ease of use.
IS manager (AU)	There is inadequate functionality to support to the user.
Academic staff (TU)	The databases need to be redesigned to match user requirements.
Administrative staff (TU)	Training is required to support the system development.
International student (TU)	Users require usability of the system interface.
Local student (TU)	Students require the functionalities to support their tasks.
IT manager (TU)	University is required to redevelop the system and its functionality in order to respond the government policy goals.

Table 39 Summary of users' key perception describing the concept of User Requirements in AU and TU

5.6.3 Research Question 3: Are there any differences between AU and TU in relation to the SAMS usage?

When organisations implement new information technologies, workarounds are traditionally created in response to a problem with a deployed system (Martin and Koopman, 2004). In AU, users employ workarounds to circumvent the control and misalignments that can occur. Most administrative users complained about the limited access to the system and databases, as they were unable to find or use the information as they used to do. Users created temporary processes in response to their access requirements. Therefore, users employed workarounds to bypass the control or official regulations to get the information they needed. In TU, the functional constraints impacted on the users in that the system lacked the functionality to support users, e.g. students' classes and scheduling. Users developed workarounds to overcome problems in the system and its functionalities. This improvisation was created as an example of IT workaround, of exploiting the system in different ways than they were originally designed. As a result, the user created the workaround to extend the system capability and functional constraints.

However, both universities are different in terms of using the workaround strategy. For instance, in AU, staff employ workaround to get information from the system when organisational controls prove too strong or counterproductive. At TU, the system fails to deliver and support the users and their tasks due to system constraints. Consequently, user requirements cannot be met due to misfits in the system design and implementation and this leads in turn to user improvisation. Moreover, the inadequacies of training and poor user support documentation are important resources that significantly impact on the quality of use. Organisational culture can play an important role in change and promotion of an innovative procedure.

In this research, there are implications that cause and affect the different uses of workarounds (system usage) as well as the SAMS in both universities. Table 40 presented the summaries of the differences between AU and TU in relation to the SAMS usage and these are described below.

The Differences	Australian University	Thai University
Organisation	IS Security Control: Access Misfit	System Development: Operational Misfit
System Quality	Usability Misfit	Functionality Misfit
Organisational Support	Inadequate Training	Inadequate Resources: help desk support, hardware facilities, poor documentations
System Implementation	Problem of System Incompatibility: Output Misfit	Problem of Data Conversion: Data Misfit
Organisational Structure	Flat, Span of control, Decentralised	Hierarchy, Bureaucracy, Centralisation
Organisational Culture	Weak with External Orientation	Strong, Internal Orientation

Table 40 Summaries of the differences between AU and TU in relation to the SAMS Usage

A. Organisation

According to Wood (2000) cited by Karyda et al. (2005) "security controls often constitute a barrier to progress and that security policies are likely to be circumvented by employees in their effort to efficiently do their task" (p. 247). For instance, the university has set up a policy to limit users accessing the SAMS to prevent them from manipulating the information. However, this limitation has become an impediment to some users, especially the administrative users who need to access the information for their tasks. Understandably, the university needs to consider the bottom-up decision-making approach. This notion means understanding what users do, or require, is the key to organisational effectiveness. It means that users in an organisation must be communicated with in order to minimise any conflict between user requirements and organisation requirements. To use organisational effectiveness as instruments of policy, policy-makers have to understand where in the complex network of organisational relationships certain tasks should be performed, what resources are necessary for this to happen, and whether the performance of the task has some tangible effect on the problem that the policy is designed to solve (Elmore, 1979).

An evidence-based understanding of students' technological experiences is 'vital' in informing higher educational policy and practice (Kennedy, Judd, Churchward, Gray and Krause, 2008). Kennedy et al. (2008, p. 109) assert that: "A thorough understanding of students' technological experiences will have clear implications for areas such as student access, equity, and transition". Kennedy et al. (2008, p. 109) concluded that "Institutional decision-making associated with the management and administration of information and

communication technologies – technological infrastructure support, resource investment, student and staff support – would also benefit from evidence about staff and students' existing experiences with technology".

Understandably, new management policy has emerged from the need for universities to improve their work processes. For instance, organisations 'change' when they transform their structures and operations; or management control systems 'change' when a new information system, such as ERP, is implemented (Quattrone and Hopper, 2001). In this way organisation can directly influence system usage.

Australian University (AU)

In AU, SAMS usage affects its overall policy and its change management style. For instance, in the various schools, administrative staff found that the new information management policy limits staff access to SAMS, resulting in misfits occurring when tasks have to be done (see Chapter 2: Limitations/Drawbacks of SAMS). Staff complained about the difficulties they faced when they tried to find information in the system. An administrative staff member reported that:

> *I found that a lot of functionality has been restricted, and others allow no access. I mean the school try to centralise a lot of things and that could be part of the development or part of the improvement of the SAMS.*

Thai University (TU)

In TU, the lack of knowledge of the SAMS' functionalities affected the system quality because the university did not fully understand or have experience of the system implementation. Having missing functions creates incompatibilities between organisational requirements and system packages. Staff reported that these sorts of issues out of the SAMS implementation project. An administrative user said:

University did not assign or authorise the people or the team who have full understanding of the system and its functions, and examine the system before it had been implemented.

In this way, workarounds occur due to misunderstanding and misalignment of system design and implementation, meaning that accessibility and functionality have to be implemented in non-official ways.

B. Good System Quality

For many years, good system quality was considered one of the most important issues in IS research though the testing of performance such as system effectiveness. Good system quality refers to the elements of a system that affect positively the end user in the way they interact and use a system (Stockdale and Borovicka, 2006). Good system quality is concerned with the achievement of objectives or desired outcomes (Negash et al., 2003, Stair et al., 2009). It is also defined whether the system's content is the dominant information characteristic, in comparison to accuracy, frequency, and decency of the information, of concern to users (Stockdale and Borovicka, 2006). The constructs of the system quality define important quality attributes such as accessibility, responsiveness, usability, functionality, flexibility, security and communication (Stockdale and Borovicka, 2006). In addition, Shin and Lee (1996) cited in Wang and Chen, (2006) propose that "system quality includes the system's reliability, functional reliability, integrity, correctness, and usefulness"(p. 1031).

However, "since software testing does not produce or ensure good software, it is only an indication of error frequency that can be expected and since verification only shows correspondence to functional requirements, a new process is needed to measure and represent the qualities of a software system" (Cavano and McCall, 1978). This way, "any measure of system quality should reflect some positive change in user behaviour, i.e. improved productivity, fewer errors or better decision-making" (Gatian, 1994). For example, effectively providing product information is one major factor that can maximise users' perceived value of a commercial web site (Teo, Oh, Liu and Wei, 2003, Keeney, 1999). Consequently, designing effectiveness programs "requires the collection of new

kinds of data that will provide information about clients' conditions at entry and exit from the services, thereby making clear about their requirements" (Kettner, Moroney, Moroney and Martin, 2007). Therefore, system quality or product quality can be achieved by understanding users' specific requirements. According to the ISO 9216 (1991), functionality and usability are interrelated and refer to a set of attributes of system quality (Stefani and Xenos, 2001). In fact, "A significant impediment to universal usability is the complexity inherent in many of today's software systems" (Baecker et al., 2000). Baecker et al. (2000) include that complex functionality as well as data complexity are all affect usability. In a system quality, usability contributes to the overall system functionality by making it accessible to the users and, in turn, facilitating effective use of the system features and capabilities (Fjermestad and Romano Jr, 2003). In this research, two areas of quality misfits need to be addressed in order to minimise such negative impacts of the system usage. These are:

1. Functionality misfit: This is one of the main issues affecting good system quality. For instance, the SAMS do not have the functions to support the user requirements. Users cannot perform their tasks because the SAMS have no functionality which is needed to execute the specific task. The misfits occur on the basis of incomplete or inadequate requirements (Light, 2005).
2. Usability misfit: In this context usability can affect functionality. Although "there is a growing body of evidence that providing extensive functionality is not enough in itself; people must understand what the functions do and how to use them" (Goodwin, 1987). For example, many administrative users found that using the functionality to search for specific information within the SAMS is difficult for them and consider it to be time-consuming. Moreover, "a more significant problem was the users' difficulty in understanding and/or remembering which set of actions was necessary for completing a specific business process" (Topi, Lucas and Babaian, 2005). As a result, "poor usability would no doubt contribute to a negative user experience which in turn would possibly discourage further use of the product" (McNamara and Kirakowski, 2006).

However, a misfit may result from some planned change in the workplace situation, like when work are reorganised and required computing resources have not been implemented,

or the 'bugs in the system' not removed (Gasser, 1986). Therefore, it is always important to consider both aspects in order to design and develop a quality system.

Australian University (AU)

In AU, an academic staff member reported that there were some errors in the system which meant the user found it difficult to complete a task. The problem of output misfit occurred due to a software error (see Chapter 2: Limitations/Drawbacks of SAMS). It was surmised that:

> *Well, it has some problems as the bugs. Normally for me, I had to work until late to complete the task because of the reporting error. I say implementation of the system affecting related policies, administrative functions, and inevitably component of the systems.*

Also, one international student mentioned that there was a compatibility problem, due to an inability to run the application resulting from system incompatible. The SAMS is incompatible to run with the other applications.

> *When I'm using a Mac with Safari, as I go to check the exam timetable and exam result. The system always kicks me out. My Mac wouldn't work with the system. But it does work with my other PC.*

Thai University (TU)

In TU, SAMS is lacking functionality because of a problem in the system implementation. This problem refers to the process misfit or functional misfit. For instance, administrative staff report that they are missing functionalities that should have been included in SAMS. According to one administrative staff member:

> *For example, we found that we want to have another function in the system which we will be using, but that it is not there. So, we need to hire the vendor to do it. The function was missing from the beginning. I can see it.*

In TU the processing error has been reported by administrative staff. They found that many mistakes regarding student grades and results were generated by the system processing function. An administrative staff member remarked:

> *For her task in doing the students result processing, she has often found a lot of problems such as incorrect grade processing, display wrong result and uncountable credits.*

As a result, the classification of misfits led to identifying the issues that affected SAMS usage. Both universities were compromised by system misfits. However, these results showed that there were differences in the SAMS misfits.

C. Organisational Support

According to Eisenberger, R., P. Fasolo and V. Davis-LaMastro (1990) cited in Foley et al. (2006) state that a perception of organisational support specific to an employee's need. In this way, organisational support would increase employees' felt obligation to help the organisation reach its objectives, and their affective commitment to the organisation (Krishnan and Mary, 2012). Thus organisational support generates further positive work attitudes (Osca, Urien, Gonzalez-Camino, Martinez-Perez and Martinez-Perez, 2005). For instance, workarounds in organisations reflect the limitations in resources (Vogelsmeier et al., 2008). They may be undersupplied, or qualitatively misaligned (Gasser, 1986). Coping with environmental problems, e.g. resource constraints and making do with available resources, is also seen an aspect of improvisation (Weick, 1993a, Weick, 1993b, Chelariu, Johnston and Young, 2002) by staff or employee. As the result, workarounds are encouraged by the problems of inadequate technology–user training (Koppel, Wetterneck, Telles and Karsh, 2008). For example, ERP systems are extremely complex and demand rigorous training (Bingi et al., 1999). Therefore, employees need training to understand how the system will change and improve business processes (Nah et al., 2001).

Australian University (AU)

In AU, the lack of training to facilitate system usage affects users. Academics complained about the training being not suitable for them due to time constraints. Therefore, many staff were not properly trained and found the systems too complicated to use. Administrative staff required training because they needed to use SAMS more than other users. One administrative staff member stated:

> *Depending of the direction of the university as the staff mentioned before, we know that AMS is more current, more accurate. There are the positives of the AMS; we are restricted because there is no more training. So, a newcomer who wants to do a job effectively will not be able to get that training in order to learn it.*

Thai University (TU)

In TU, academic staff need more support from the university for their system usage. However, poor and inadequate help-desk support has been reported in schools and faculties. Academics were unable to find more support from the university. In TU, staff complained that the resources and facilities such as computer hardware and other equipment were inadequately supplied. An academic said:

> *Why do some users still do not have their own computer to access to the system? Four people in my room are sharing one computer, and now it is not working. Well, we have to find a computer from another room to use.*

D. System Implementation

Workarounds related to technology implementation and they resulted from: firstly, intentional technology blocks designed to enhance resident safety; and secondly, unintentional technology blocks resulting from ineffective technology design (Vogelsmeier et al., 2008). For example, administrative personnel adopt workarounds to

cope with early problems that come from a new human resources system. As a result, many users had developed numerous effective, but often inefficient, ‘‘workarounds’’ for problems they encountered (Umble, Haft and Umble, 2003).

Australian University (AU)

In the case of AU, the impacts are blamed on the system implementation phase. For instance, administrative users mentioned the SAMS had been originally designed for the US market whose education system is markedly different. However, the implementation ignored this basic reality and continued to implement the SAMS in an Australian University structure. As a result, staff worked with a system in an environment for which it was not designed. This obstacle has impacted on the organisational effectiveness of staff. As one administrative staff member put it:

> *It was a system generated for the American tertiary system and it was brought in to Australia education, for Australia universities, and what we identified is that we have to fit them all in. And I think that is where the problem was.*

Thai University (TU)

In TU, the SAMS was implemented in the main campus and then connected to the other two campuses. However, the problem here was that of the data conversion process due to the incompatibility of database design with other campuses’ systems. An administrative staff member said:

> *I would say that problems occurred because we converted students’ data from the other two campuses that were using their old database systems. It still has some problems with our data conversion.*

E. Organisational Structure

According to Koppel et al. (2008), organisation-related and technology-related causes are associated with multiple workarounds. Organisational structure refers to the pattern of relationships and tasks defined by official rules, policies and systems (Lucey, 2005). The patterns of thinking, feeling, and acting included in Hofstede's (1991) definition raise the likelihood that culture will simultaneously influence and be influenced by organisational structures and process, because both are subject to people's thoughts and actions (Lau, McMahan and Woodman, 1996, Dimmock and Walker, 1998). This structure may promote specific information needs for an organisation (Gordon and Gordon, 2004). In fact, the existing organisational characteristics are influencing the design process and the notion of misfits (Pries-Heje, 2006). March and Simon (1958) (cited in Ciborra, 1999, p. 82) note that "organisational structures do influence, even down to the smallest detail, decision-making at all levels of the hierarchy, through sophisticated mechanisms of communication, coordination and authority". This is despite the fact that IT infrastructures constitute the prerequisite for system implementation (Huang and Palvia, 2001). This way, organisational structure is the consequence of unfulfilled requirements (misfits) which is due to the decision-making style of the organisation.

Australian University (AU)

It is notable that both universities are dissimilar in structure and size. AU is considered to be a large university while TU is a medium-sized institution. AU has a flat hierarchical structure and decentralised control structure across the schools, research centres, and campuses. According to Gordon and Gordon (2004), a flat structure can have the advantage of reducing time for decision-making and faster changes because decision-makers are closer to the sources of information. In AU, the faculties and schools can make their decisions based on broad university directives. Organisation pyramids are flat hierarchies that are established to equalise roles and decentralise decision structures (Hofstede, 2001).

Thai University (TU)

In TU, the university structure is a traditional tall hierarchical organisation which includes three campuses in nearby locations. According to the government legislation, in 2005 the university was officially created by combining colleges to establish one university. As a hierarchical structure, a decision starts from the top and passes to the other levels where they are executed. As a result, the university is very centralised and does not adequately respond to local needs and conditions (Kanthawongs and Kanthawongs, 2003). As well, all of the administration activities and decisions are highly specified and centralised. This way, decision-making is slow but stable and reflects a typical bureaucratic tradition (Ahmed, 1998).

F. Organisational Culture

Organisational culture is recognised as a key component in the organisational change literature (Bartell, 2003). The organisation level is where institutions develop their own distinctive culture which is recognised and (generally) accepted by the people working in them (Sommerville and Rodden, 1996). However, organisational culture in higher education is complex and has a unique set of features such as special beliefs, values, and attitudes (Sporn, 1996). While the institution is shaped and constrained by its own characteristics, it is also directly influenced by the outside world (Collis and Wende, 2002). With the worldwide adoption of ERP in universities, Sporn (1996) concludes that the higher interest in the application of organisational culture in universities derives from a business-oriented culture. Organisational culture is recognised as one of the critical success factors of ERP implementation (Cox and Spurlock, 2005a). The presence of workarounds may also highlight a dynamic organisational culture and a willingness to innovate and improvise (Ferneley and Sobreperez, 2006, Petrides et al., 2004).

Australian University (AU)

In AU, users have divergent attitudes, beliefs and values in their workplaces and everyday duties. For instance, academics are more likely to be interested in their teaching and research activities, as opposed to the administrative tasks that they perform using the

SAMS. As well, such tasks only compose a minor part of their workload for most academics. On the other hand, for administrative staff and IS managers, the tasks associated with SAMS are more central to their work activities and take up a significantly larger proportion of their workload. The differences in concerns and interests suggest that the university has relatively loosely linked subunits or groups with specific cultures that can be contradictory (Sporn, 1996; see Chapter 2). Conversely, a loosely controlled culture is one with only weak acceptance of shared beliefs, values, and practices, and little or no controls are exerted (Dimmock and Walker, 1998). One academic user refuted this contention:

> *I think you will find that no one uses the system in the school. Because we don't actually go there and enter the information, we have specialists to do that. Yes, that is the admin task. They will do that. We concentrate more on teaching. We're just do our tasks.*

As a result, workarounds are less likely to be recognised and created by academics because they can receive more support from administrative services. According to Sporn's (1996) university culture guideline, AU is considered to be a weak culture with a focus on the external environment. Sporn (1996) concludes that with this external orientation, the university supports adaptive strategies of management better than internally focused cultures.

Thai University (TU)

In TU, the bureaucratic system is traditionally used as part of the university's management. The university is centralised and run by the university council. At TU, staff members share the same attitudes, beliefs and values of a collectivist culture. Such a strong commitment might emerge through supervision and control by super-ordinates or through members (Dimmock and Walker, 1998). They are more concerned with internal issues. An administrative staff member responded to the interview question as follows:

> *Yes, when I found the problem in the system, I must report it to the group leader and then she will report it to the system*

manager. After that if we cannot fix that problem, the system manager will report it to the head of the division.

According to Wallach (1983) cited by Esteves (2008), report that "bureaucratic cultures have clear lines of responsibility and authority and work is highly organised, compartmentalised, and systematic" (p.46). For instance, "When bureaucratic organisations need to send information to the right recipient, they are likely to use standard channels or procedures" (Westrum, 2004). This means that university members and their tasks are essentially part of bureaucratic processes and there is a consistency between strategic and structural issues having priority over external challenges (Sporn, 1996). In the workplace, hierarchy means existential inequality between grades of people who work there (Dimmock and Walker, 1998). Hence, a closer look at this "organisational decision-making, seems to rule out improvisation completely" (Ciborra, 1999).

As a result, workarounds may not, or be less likely to be used or exist at TU because staff and members must follow the procedures and depend on the decisions of senior or upper management levels.

5.7 Summary

This chapter discusses the findings concerning systems usage in Australia and Thailand universities, and what implications they may have. The chapter has also synthesised the findings of the empirical study (in Chapter 4) to validate the research theory. The results show that there are 15 concepts associated with system usage (as shown in Figure 15). These concepts indicate that the organisation is the key that influences and determines system usage. According to the research discussions, system usage is also closely linked to the nature of the organisation. For instance, the university determined that SAMS must be used by staff and students. The SAMS is set-up as a mandatory system and has replaced the legacy systems. SAMS is helping staff to reduce the time and effort that went into manual systems. Students and some academic staff perceive the same benefit of using the system.

In these findings, academic staff and students in both universities have an option when using SAMS. The findings report that the organisational policy has played a significant role that impacts on system quality and task requirements. The findings also indicate that user requirements have not been adequately analysed and documented as meeting users' needs. Most users report that poor system quality is a direct outcome of organisational change and policy. Policy makes an impact in the areas of accessibility, functionality, resources and facilities, and training. Users adapt and use manual processes or strategies (workarounds) to use the system to their advantage. The workarounds have been developed in order to bypass system constraints and problems, which in turn reflect an issue of poor quality. The findings also reveal that SAMS are difficult systems to operate. Therefore, system usability is an important requirement for users. In this discussion the concepts of functionality and usability are those requirements most demanded by users.

When comparing AU and TU, it is notable that SAMS consists of many systems which are integrated with administrative management systems and several office-based applications. However, it has been reported that the number of integrated applications of SAMS in TU is less than those of AU (see Chapter 1: The context of SAMS, Table 4: the frequency of systems usage and the users in AU and TU). In contrast, the SAMS in TU is therefore less complex than AU's systems.

There are many similarities when comparing both universities in terms of system complexity, availability, reliability, and system quality. However, the research study found differences in the context of use and organisation - organisation policy, system implementation, resources and facilities support, organisational structure, organisational culture and workarounds. The findings presented that administrative staff in both universities employ SAMS more than any other user group. Another consideration is that SAMS is mainly designed for administrative tasks, and administrators need it when supporting or advising other users. Conversely, SAMS are not mandated for academics and they are less concerned with how SAMS can help them, because the systems are not concerned with their teaching practices (Collis and Wende, 2002). As well, the SAMS have not been proposed for the academics to use as a strategic tool for teaching and learning. They also received the support from administrative staff. Similarly, students used the SAMS for their convenience in doing their tasks, such as enrolling in subjects, checking results and information, and so on. Most students therefore perceived that

SAMS was required for them. However, these activities are compromised because universities have provided the support for them. For example, students can use the paper-based application for their late enrolments.

In AU, the policies of IS management affect the users, particularly in its various schools' administration processes. Staff members complained that they were unable to access the information due to the security policy. As a result, many administrative staff perceived that SAMS is not designed for Australia's tertiary education system. The existence of functional misfits and poor usability was identified by staff and students. Many staff complained that they had not received enough training, reflecting the fact that the SAMS are very complex to master and users require specific understanding in order to use it more effectively. In AU, there is a mix of cultures since staff share different interests. University members are more concerned with the external issues of the organisation (see Chapter 2: university culture topology). In AU, schools and administrative staff value SAMS more than other users. Therefore, administrative users are more concerned with the SAMS usage.

In TU, university policy has an influence on the system development and implementation processes. The findings confirm previous studies' findings of system complexity, resource requirements, and management commitment being the keys to ERP implementation (Kanthawongs and Kanthawongs, 2003). For instance, administrative staff reported that there was inadequate system testing during the implementation process. Also, systems usability in terms of task analysis had not been evaluated and tested properly when the system was implemented. In fact, the lack of knowledge and responsibility of the project leader were found to have impacted significantly on the system functionalities. Many problems arose, for instance, when the university combined and converted the legacy databases into a new overarching system. Staff members were unable to import data from other sources to process their reports. Also, the system lacked certain functionalities to support people's tasks, especially administrative users.

Consequently, SAMS became problematic to the users. Moreover, the infrastructure and facilities such as hardware and equipment are reported to be insufficient. According to the organisational structure at TU, the decisions are made at the top and filter down through the organisation in a centralised fashion (Pearlson and Saunders, 2006). Making

a decision requiring approval for further university requirements rested in the hands of the upper management (Thanasankit and Corbitt, 2000). Consequently, the decisions and results were often slow in processing and took time for completion and to be filtered down to the administrative staff. In TU, university members shared uniform values of interest, and staff and members are more concerned with the organisation's internal issues. Beaudry and Pinsonneault, (2005, p. 505) conclude that the organisational context (e.g. structure, policies and culture) and IT context (e.g. how the system was developed and implement, training, support, and functionality of the system) have the potential to influence user adaption as workaround.

6 Conclusions

According to the discussions in Chapters 4 and 5, the analysis resulted in important findings using the grounded theory approach. The concepts constituting both the empirical data and literature were discussed and reported. The core concept of the SAMS usage has been identified as 'Workaround' which is significantly linked to the concepts of 'Organisational Policy', 'User Requirement' and 'System Quality'. Based on the findings, this chapter discusses the new system usage framework using as its basis the framework devised by Burton-Jones (2005) in the study of system usage. This chapter also describes the study's limitations and where future studies can contribute on this topic. The recommendations are also presented to contribute to the future study of system usage regarding the gaps and effects that prompted this research.

6.1 The Conceptual Framework

Due to the lack of explicit conceptualisation of system usage in past research, a research framework has been developed in order to help researchers explain better the relationship between system usage and downstream outcomes (Burton-Jones, 2005). By using the quantitative approach, Burton-Jones (2005)'s study employs a very rich method (see Figure 30) in which data was collected from students, specifically users who enrolled in an intermediate accounting course at a university.

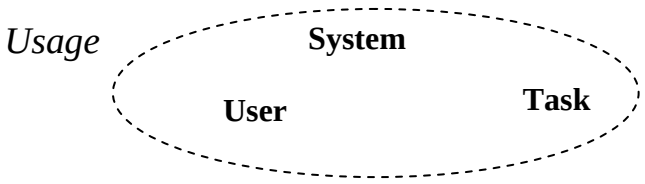

Figure 30 The Conceptual Framework of System Usage *(Burton-Jones, 2005)*

Burton-Jones's research framework contributes to this by:

- Clarifying the nature of system usage;
- Providing a validated and explicit set of steps and principles that researchers can use to select or evaluate measures of system usage for a given theoretical context;
- Providing validated measures of system usage for specific theoretical contexts; and more generally
- Demonstrating how constructs in IS research can be conceptualised and measured in a diverse and disciplined way.

Despite several contributions to the research, Burton-Jones (2005, p. 215) concludes that "measuring individual performance will not provide very meaningful insights into how usage of an organisation's information systems leads to important outcomes such as employee, workgroup, and organisational performance". Consequently, Burton-Jones proposed that future research can benefit from a better understanding of how systems are actually used in practice (i.e., the ontological imperative) as well as how system usage leads to relevant outcomes (i.e., the epistemological imperative) by illuminating new directions for research on the nature of system usage, its antecedents and its consequences. Thus, Burton-Jones (2005) adds that "the researchers must choose appropriate measures for their objective, theory and methods" (p. 40).

In order to gain a deeper and better understanding of the systems usage, a qualitative approach has been employed here as the research methodology (Chapters 2 and 3). This study has currently identified the framework for studying system usage in an education environment. The study has also recognised 'Organisation' as an additional element that would influence, and can also plays a major role in system usage. For instance, an organisation is shaped by how it uses its information systems because it needs to make decisions based on how these systems are actually being utilised (i.e., in terms of system load) irrespective of employee cognitions (Burton-Jones and Straub, 2006). Consequently, organisations differ from each other in terms of their rules, relationships and management. Therefore, in selecting the technology such as Information System solutions, organisational management must engage in an at times complex, decision-making

process (Jones, Kriflik and Zanko, 2005). Specifically, the use of IS/IT depends on the organisation as well as its decision of authority and responsibility (Kvavik, 2002).

This research developed a conceptual framework to analyse the usage of SAMS in universities. This conceptual framework is an extension of the framework presented by Burton-Jones (2005). Figure 31 adds the concept of organisation to those of task, user and system and has been useful in generating theoretical understandings of systems usage in the context of the thesis. It is likely that this conceptual framework can be extended in other more general studies of information systems usage. In particular, an important distinction between this study and Burton-Jones's research (2005) is the methodology, in that this research has employed a qualitative approach to reveal how the systems have been used and what the effects (implications) of using the systems are for people, rather than being measured from data that is collected quantitatively or statistically. Although this research employs a different approach to exploring the use of SAMS, the new conceptual framework does contribute to Burton-Jones' (2005) framework, so that in future studies system usage in an organisation can be examined in two different ways (quantitative and qualitative methods) simultaneously.

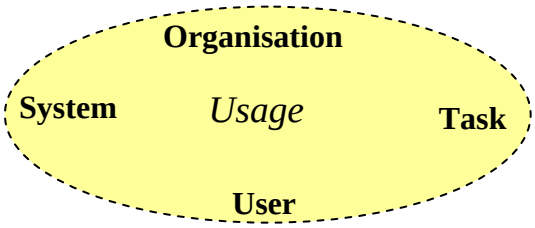

Figure 31 The new Conceptual Framework of System Usage

6.2 The Significance of Research Findings (Concept)

This section describes the preliminary findings (concepts) which were found to be similar to the literatures. However, these findings can be minimised by learning and understanding from their consequences. In order to address the issues, this research has concluded and proposed the key concepts that would contribute to the future of system usage as follows:

- Organisational Policy
- System Usability

- User Requirement
- Workaround

6.2.1 Organisational Policy

The organisation needs to consider the system usage approach in order to understand and deliver the requirements to the system, task and user. In particular, the strategic use of ICT for the diversity of higher education will require explicit policies in order to further enhance the flexibility in terms of system development, integration, accessibility, user convenience, etc. (Collis and Wende, 2002). For instance, the security policy must be reviewed and evaluated, particularly altering any major change in the configuration or operational mode of the IS (Karyda et al., 2005). This factor significantly continues to impact on the effectiveness of the system usage in the post-implementation phase. Moreover, policy implementations should include an investigation of technology, task, organisation and environmental circumstances in order to effectively address the control of system usage. For example, an organisation must explicitly understand the role of users in order to correctly designate the access control mechanism, that permits users to allow or disallow other users access to objects (system, resources) (Ferraiolo and Kuhn, 2009). On the other hand, organisation as well as senior or upper management commitment is also needed so that users have enough resources, and supports. Specifically, organisational support is widely recognised as necessary for ERP implementation (Ngai, Law and Wat, 2008). An organisation also needs to make plans for their IT and/or IS infrastructure, as well as for the allocation, maintenance and upgrading of physical space (Ellis, Ellis and Goodyear, 2009). For further enhanced flexibility, organisational policy needs to be justified in terms of system development, integration, accessibility, user convenience, and so on. As the strategic use of ICT will require explicit policies (Collis and Wende, 2002).

6.2.2 System Usability

System usability can be achieved by designing the system with collaboration from the users (Topi et al., 2005). Furthermore, usability testing must be coined to represent the process of involving users in order to ensure that the system meets usability criteria

(Corry, Frick and Hansen, 1997). To improve the system usability, the system should be designed to be more flexible to enhance the ease of operation and adaptability. For example, careful analysis of usability, using appropriate methods and asking relevant, answerable questions, should reveal usability defects and therefore indicate clearly what needs to be changed so that the system functions even better in the next version (Lindgaard, 1994). These approaches mean to fill and/or bypass the gaps between the task and function which are needed by the user. For instance, providing a user with a reporting wizard that allows reports to be customised easily (Yuthas and Young, 1998).

In a situation with a lack of functionality or misfit, the use of manual workarounds is recommended rather than relying on the system (Soh et al., 2000). Particularly, when a system failure or crash occurs, a manual workaround is a method to cope with the situation. It can also refer as a back-up procedure in order to minimise the problem from processing error and/or system failure. As a result, organisations should encourage the use of workarounds and consider it as information in order to understand the situation and circumstances of the users as well as the systems. Hence, workarounds represent a collective knowledge about users' needs and reactions toward the system (Safadi and Faraj, 2010), which can contribute to the system usability.

6.2.3 User Requirements

Although, the traditional software engineering theory and method based on definite users with specified user requirement and goal cannot guarantee the software quality and meet the personalized" (He, Liang, Peng, Li and Liu, 2007). He et al. add "most of software system development faces the same problem as those met during the first software crisis, such as extended delivery deadline, inestimable development cost, and failure in system development" (2007, p. 2). In this way, organisation should continue to evaluate and analyse the usage as frequently as possible. For instance, the feedback on end-user concerns and ideas must be provided quickly (Karsh, 2004). Meanwhile, understanding how and why users adopt, adapt and integrate a technology into their practices enables their requirements to be harvested in order to design future versions or technologies (Carroll, 2004). For instance, universities can benefit from knowing what students expect (Ellis et al., 2009) from the SAMS. Obviously, this has implications for university

planning of IT/IS implementation. Finally, an organisation needs to understand the importance of the user's feedback because this information provides insights regarding user requirements, which could suggest the areas of attention where the system needs to work as an information system (Petrides et al., 2004) For example, staffing a help desk that is accessible in person, by telephone, or over the computer with knowledgeable personnel at all times when users are engaged in using the technology (Karsh, 2004). Moreover, compulsory training sessions, technical usability improvements, control routines and other initiatives should be executed to prevent problems arising (Gasparas and Monteiro, 2009). Training should be based on aspects of the system usage that are relevant to users and their tasks. However, the organisation should consider the flexible times in which users can attend training.

6.2.4 Workaround

Workaround is defined as an alternative approach when the system is unable to provide or deliver to user needs. Consequently, new knowledge will be created because the user has learned to adapt to, adjust, and circumvent a problem that has arisen in the system (Safadi and Faraj, 2010). In this way, the workaround presents an opportunity to analyse and learn from the situation (Lalley and Malloch, 2010). The implementation of flexible technology will include a process of workarounds as people develop their knowledge structures concomitant with developing their technology (Brady, 2003). Users often put in effort in order to circumvent a problem situation and as a result, the impact is to create a learning curve for the user.

Workarounds can be considered as a form of feedback or guidable message for what is required. People employ workarounds because they have not been able to obtain what they need from the central information systems (Petrides et al., 2004). In this way, the workaround is considered information that indicates, or tells people about, the condition of the system. Therefore, workarounds should be encouraged in order to identify a gap or problem. In many cases, workarounds help to minimise budget costs and resources without going through a redevelopment process. Specifically, a manual workaround can provide greater leverage in primary work than going through the process of changing a system (Gasser, 1986). For example, users can also continue to work and process their

tasks without interrupting the system until a solution is found. Moreover, the practical importance of workarounds is helping to find a satisfactory or quick solution.

6.3 Research Limitations

In this research, there are a number of limitations that affected the study project. First, the scope of the research was not intended to investigate and study the SAMS implementation. However, this issue was revealed as one of the significant concepts in the system usage. Second, this research was only conducted with two universities – one in Australia and one in Thailand. According to Shanks et al. (2000) the findings may not be strongly generalisable as only one university is selected for representing each country. In addition, the number of cases (countries) may limit the generalisability of the theory. Therefore, "it is possible that comparing the experiences of informants from different regions and/or different countries could result in a modified theory" (Pace, 2003). Third, the research was not intended to explore other areas such as leadership, management, and organisation, which can be significant factors in systems usage in such organisations. Hence, the research study focused specifically on usage which may not fully reveal the consequences of the impacts to the systems in the universities. In this way, future research may continue to expand by increasing the number of case studies and their contexts in order to support the validity of the theory.

6.4 Future Research Directions

Future research may be scoped into different areas of business communities and industrial sectors so that findings can be generalised. Understandably, further research must be carried out in order to validate or test the substantive theory. A new researcher may also apply different methodologies such as:

- A quantitative study: This choice of study will enhance the reliability and validity of the research. Future research can include empirical measuring and testing of the relationships between the major categories and variables. The primary advantages of statistical methods include their ability to estimate the average explanatory effects of a variable, and their ability to analyse the

representativeness or frequency of subsets of the data collected (Bennett, 2004). Mixed method research uses qualitative and quantitative data collection techniques and analysis procedures at the same time (Saunders et al., 2007), to gain a better understanding of the findings' meaning and their implications (Malterud, 2001). This approach to research will increase the validity of the study or analysis.

- The case study approach can be applied and extended to examine the system usage into different types of businesses or industries, such as commercial or non-profit organisations. This research approach will not only provide new prospects to the area of study, but it may also help to promote the substantial understanding of the ERP usage and its impacts in a variety of organisations and environments.
- Further research could increase the number of case studies and indeed, comparing multiple case studies can contribute to the research findings and support the integrity of a theory. The country case studies produced by area specialists are crucial building blocks in most comparative work (Collier, 1993). Also, cross-cultural comparisons can provide insights into different system usage practices. Future research may aim to explain the ways in which a culture constructs and is constructed by the behaviours and experiences of its members. Consequently, an ethnography study can employ many methods of data collection. These may range from observational data, video tapes, photographs and recordings of speech in action.

6.5 Summary

This study revealed that system usage was influenced by organisational factors and poor system usability at AU and TU. The research study described the findings of system usage in relation to the importance of the user's role and task. In this study, the core concept revealed that the users employed workarounds to deal with system constraints. Based on the research findings, a substantive theory has developed for evaluating and facilitating system usage. In addition, the recommendations for contributing to the system usage have also been presented as future research directions. This study highlighted the significant issues affecting SAMS usage at AU and TU. The research study has also provided an understanding of how users employed and managed the SAMS in their daily

work or studies. Moreover, this study is significant to such universities in so far as universities, having a better understanding of the SAMS usage, now have the means to improve the quality of SAMS. This study is predicated on the basis that the substantive theory which has emerged from the research findings can contribute to the future of IS research in the context of ERP or SAMS usage in organisations.

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Appendix A: Ethics Application

The Ethic application

RMIT University PHRESC Register No. Date Application Received PHRESC Use Only

BUSINESS PORTFOLIO 2008

Application for Ethics Approval of Research Involving Human Participants

1. This form is to be used by Masters, PhD, Professional Doctorate candidates and staff undertaking research in the 'Risk level 1' and 'Risk level 2' categories as described in the accompanying guidelines. All applications must be completed by filling out this form in its electronic version and printing it out. 'Risk level 3' applications must be completed on the RMIT Human Research Ethics Committee form available at www.rmit.edu.au/rd/hrec_apply
2. This form is available at www.rmit.edu.au/bus/research/ethics
3. Candidates should submit applications early and allow at least **30 working days** for assessment and approval.

Section A: Approvals and Declarations

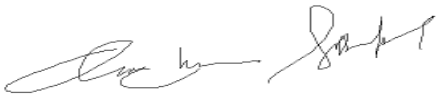
Project Title: The usage of Student Administrative Management Systems: The Comparative Study of Australia and Thailand Universities

Research Degree	**Staff Research Project**
Complete this column if you are undertaking research for a **research degree** at RMIT or another university (Masters of Business by Research/PhD/ Professional Doctorate)	Complete this column if your research is not for any degree.
Investigator	**Principal investigator**
Name: **Mr. Cherngchai Suwannakoot** Student No: **S 3178202** Qualifications: **: Master Degree of Information Systems** School: **BIT** Address: **108.17.90** Phone: **(03) 9925 1512** Email: **E73831@ems.rmit.edu.au** Degree for which Research is being undertaken: **PhD in Information Systems**	Name: Qualifications: School: Phone: Email:
Senior Supervisor	**Supervisor**
Name: **Dr. Martin Dick** Qualifications: **PhD, Senior Lecturer**	Name/s: **Dr. Pradip K. Sarkar** Qualifications: **PhD, Lecturer**

School: **BIT** Phone: **(03) 9925 5976** Email: **martin.dick@rmit.edu.au**	School: **BIT** Phone: **(03) 9925 1580** Email: **pradipta.sakar@rmit.edu.au**

2. Declaration by the investigator(s)

I/We, the undersigned, accept responsibility for the ethical conduct of the research detailed below.
I/We have read the current NH & MRC National Statement on Ethical Conduct in Research Involving Humans 1999 (in particular, see Principles of Ethical Conduct pp.11-14), and accept responsibility for the conduct of the research in this application in accordance with the principles contained in the National Statement and any other condition laid down by the RMIT Human Research Ethics Committee



Signed:_____ Date: 10 November 2008
(Signature of investigator)

Signed:_____ Date: _____
(Signature of other investigators if applicable)

Appendix B: Ethics Approval

The ethics approval

PHRSC Register Number: 742
Date Application Recd: 10-Nov-08

RMIT
PORTFOLIO HUMAN RESEARCH ETHICS SUB-COMMITTEE

Application for Approval of Research Project

SUMMARY & APPROVAL

Project Title: ***The Impact of Student and Administrative Management Systems Usage: the Comparative Study on Australia and Thailand Universities***

Name of Researcher: Cherngchai (Rick) Suwannakoot

Category of Research Project: 2

Degree for which research is undertaken as part of a degree (if applicable): N/A

School Name: Business Information Technology

Contact Telephone Number: 9925 1512

Email Address: E73831@ems.rmit.edu.au

BUSINESS HUMAN RESEARCH ETHICS SUB COMMITTEE USE ONLY:

Date Application Received: 10 November 2008

Portfolio Human Research Ethics Sub Committee Register No: 742

Period of Approval: 13 January 2009 to 3 March 2012

Comments / Provisos: N/A

The Business Human Research Ethics Sub Committee assessed the Project as Category 2

Signature: _____ **Date: 13 January 2009**
Associate Professor Adela McMurray PHRESC Chair

Appendix C: Interview and Focus Group Questions

Research interviews and focus group questions

Briefly introduces the participants about the system (SAMS):

1. What are your opinions about SAMS?

2. What is your view in term of using SAMS for working?

3. Why do you use the ……. Systems? (Mandatory or Optional)

4. What purpose of using ……. Systems?

5. Do you have any option, by not to use or use the system to complete that task?

6. Does the…….system provide you what you need?

7. Can you describe any difficulties you might have had when using the …systems?

8. How do you deal with the problem?

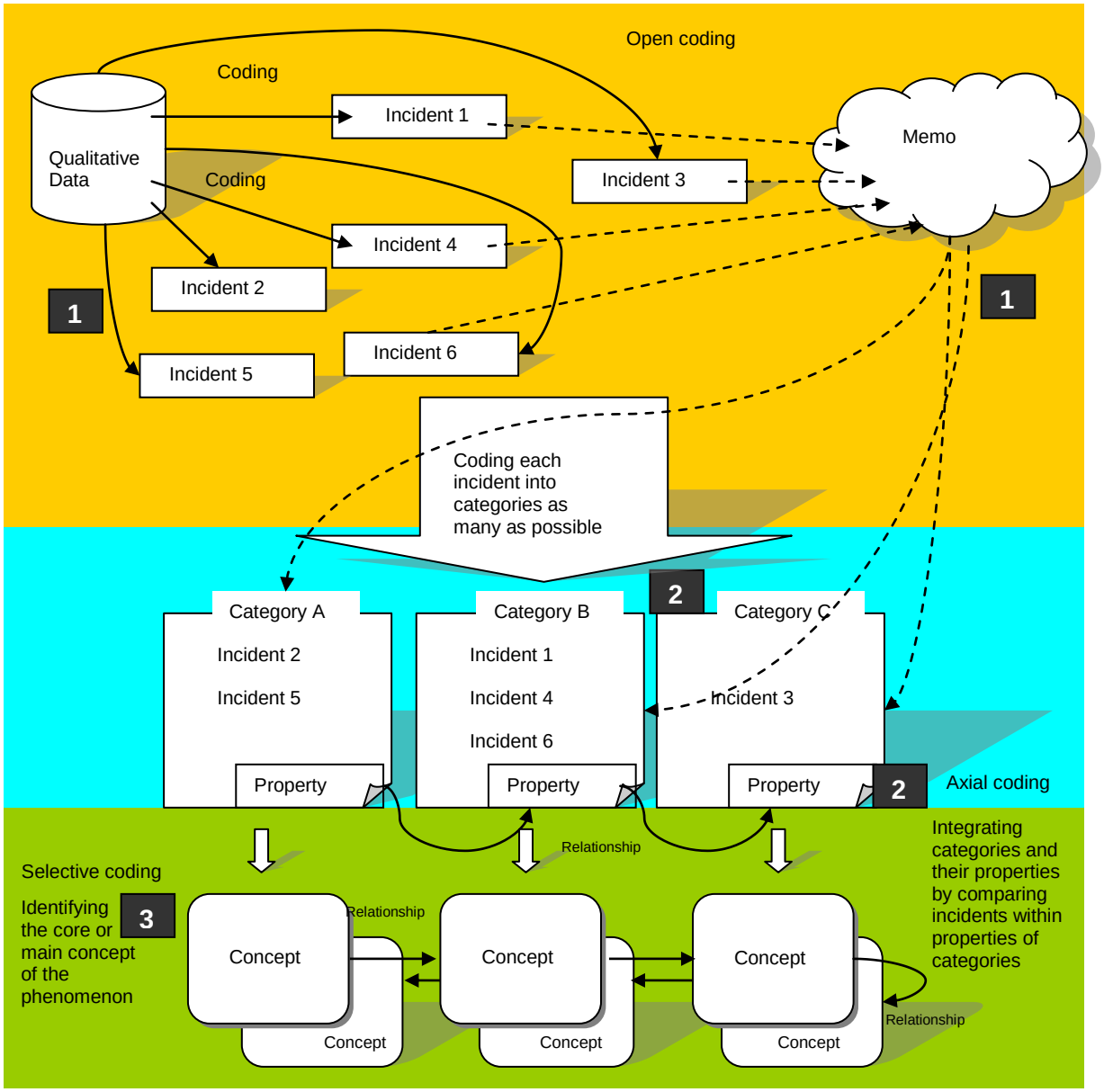
(Extended for IS/IT manager)

1. Have you received any feedback from staff and student in term of using SAMS?

2. What kind of feedback that you have received? (Positive, Negative)?

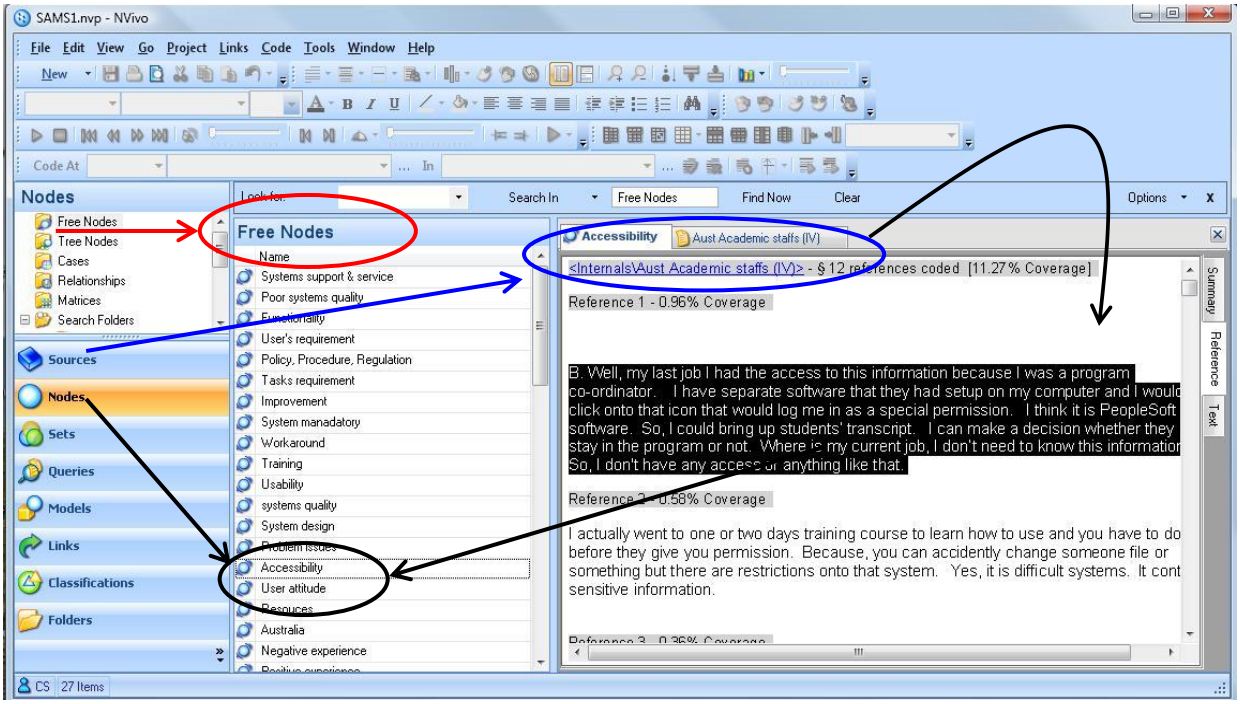
Appendix D: Grounded Theory Processes

Grounded theory processes, (Developed for research purposes)



Appendix E: Open Coding

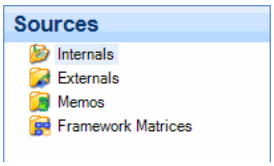
Open coding in NVivo



Appendix F: Memos

Using memos in NVivo (International, 2007)

Memos are stored in the Memos folder in the Sources group in Navigation View



To create a new memo :

1. In **Navigation View**, click the **Sources** button.

The sources folders are displayed.

2. Click the **Memos** folder. If you have created other memo folders, you can select one of those.

3. Click the **New** toolbar button.

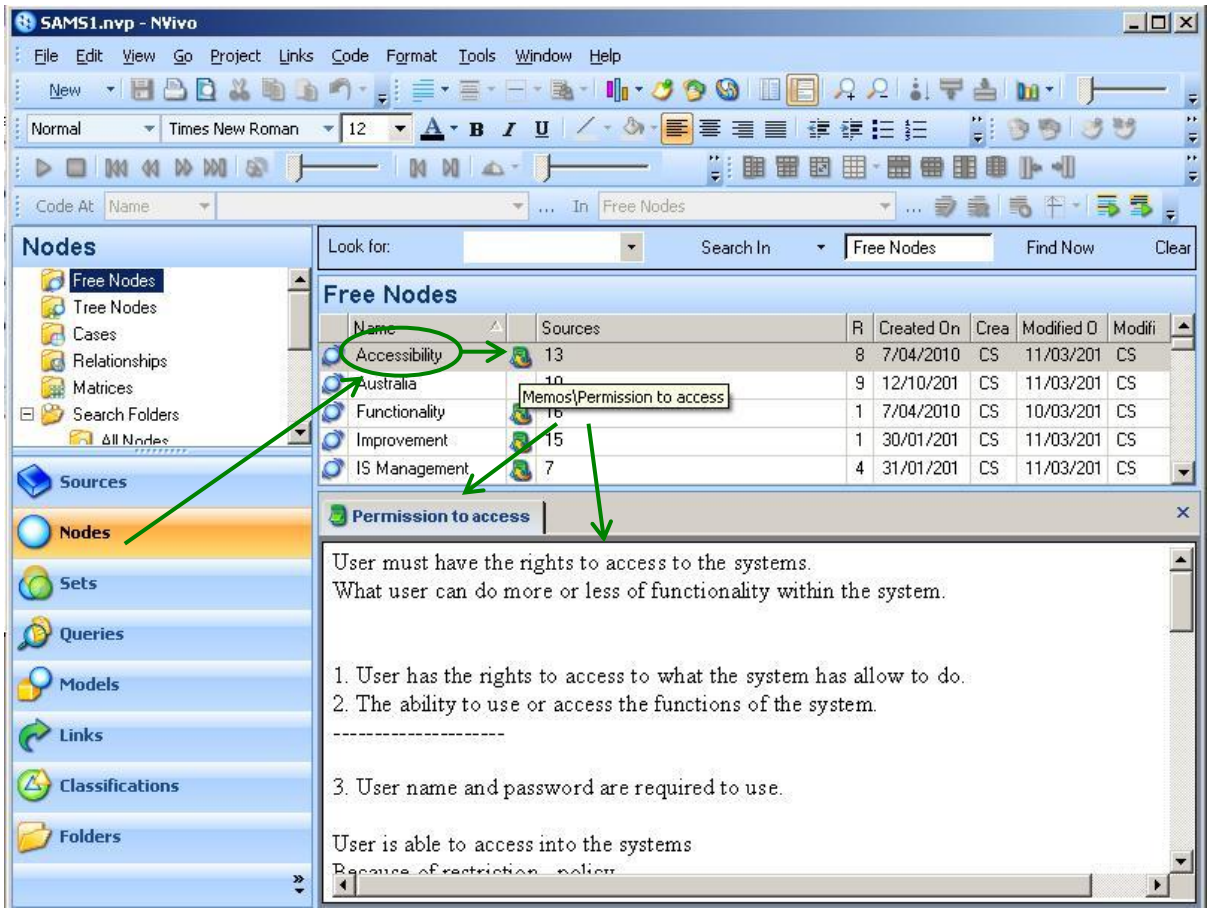
4. Click the **Memo in This Folder** option**.**

The **New Memo** window is displayed.

5. Enter a name in the **Name** field.

6. If required, enter a description of the source in the **Description** field.

7. Click **OK**.



The new memo is opened in **Detail View** and you can add the required content.

Appendix G: Initial Items (Concepts)

Initial analysis concepts (Open coding)

System	1. American system 2. Complicated to use 3. Difficult to use 4. Data inconsistency 5. Easy to use 6. Effectiveness of the systems 7. Fast access 8. Fast process 9. Flexible to use 10. Problem issue 11. Functionality 12. Hard to find information 13. Need to improve 14. Ineffectiveness of the systems 15. Information is not up-to-date 16. Not enough information 17. Not suitable to use 18. Not user friendly 19. Program, subject, curriculum, and pre-requisite functions 20. Saving time 21. Slow access 22. Slow processing 23. System availability 24. Compatible 25. System clash 26. System design 27. System amendment 28. System error 29. System limitation 30. System support 31. System testing and evaluation 32. Too much information 33. Unreliable 34. Usability 35. Useful 36. Useless 37. User interface design 38. User manual, guide 39. Vendor support / contact
Task	40. Customer service 41. Fix the problem 42. Mandatory to use 43. Manual operation 44. No support 45. Optional, alternative 46. Task analysis (requirement) 47. Time consuming 48. Time limitation 49. Training 50. Task and responsibility 51. Task requirement 52. Workflows
User	53. Accessibility 54. Basic use 55. User involvement 56. Complaining 57. Different need 58. Difficult to remember

	59. Experience 60. Expectation 61. Feed back 62. Frustration 63. Getting information out of the systems 64. Handling the problems 65. Occasion 66. Learn to use 67. Not interested in using 68. Not happy 69. Not required to use 70. Know how to use (Perceived use of the systems) 71. Satisfaction 72. Self-service 73. Skill, knowledge 74. Training 75. Trust 76. Unable to access 77. Unacceptable to use 78. Understandable 79. Unsatisfactory 80. User attitude 81. User error 82. User expectation 83. User rights 84. User requirement 85. Wasting time 86. Workload
Organisation	87. Authorisation 88. Customer service 89. User centre design 90. Support centre 91. Investment 92. IS management 93. Management level 94. Resource and facility 95. Organisational structure 96. Policy, procedure, regulation 97. Resource facility 98. Security issue 99. Technology driven
Usage	100. Acceptable to use 101. Unacceptable to use 102. Adaptation 103. Manual use 104. 105. Level of use: often, rare, never 106. Workaround

Appendix H: Concepts by Number of User Groups

	Organisational Policy
Accessibility	9
Adaptation	1
System quality	5
Functionality	9
Poor system quality	12
Mandatory system usage	10
Manual workaround	9
System implementation	6
Tasks requirement	13
Training	5
Usability	5
User requirement	11
Workaround	3
Resources	7

	User's requirement
Accessibility	4
Adaptation	3
System quality	5
Functionality	12
Poor system quality	13
Mandatory system usage	7
Manual workaround	2
Organisational Policy,	11
System Implementation	5
Tasks requirement	12
Training	5
Usability	12
Workaround	5
Resources	11

	Poor systems quality
Accessibility	6
Adaptation	7
Functionality	12
Systems quality	9
Mandatory system usage	8
Manual workaround	10
Organisational Policy	12
System implementation	11
Tasks requirement	9
Training	6
Usability	11
User requirement	13
Workaround	9
Resources	13

	Task requirement
Accessibility	9
Adaptation	2
System quality	6
Functionality	9
Poor system quality	12
Mandatory system usage	12
Manual workaround	9
Organisational Policy	13
System implementation	7
Training	9
Usability	8
User requirement	12
Workaround	4
Resources	11

	System mandates usage
Accessibility	2
Adaptation	1
System quality	5
Functionality	6
Poor system quality	8
Manual workaround	5
Organisational Policy	10
System implementation	2
Tasks requirement	12
Training	2
Usability	7
User requirement	7
Workaround	1
Resources	7

	Functionality
Accessibility	6
Adaptation	5
System quality	6
Poor system quality	12
Mandatory system usage	6
Manual workaround	2
Organisational Policy	9
System implementation	9
Tasks requirement	9
Training	6
Usability	11
User requirement	12
Workaround	4
Resources	12

	Usability
Accessibility	6
Adaptati-on	5
System quality	7
Functionality	11
Poor system quality	11
Mandatory system usage	7
Manual workaround	0
Organisational Policy	5
System implementation	10
Tasks requirement	8
Training	7
User requirement	12
Workaround	3
Resources	9

	Workaround*
Accessibility	5
System quality	1
Functionality	5
Poor system quality	13
Mandatory system usage	3
Organisational Policy	9
System implementation	6
Tasks requirement	8
Training	1
Usability	6
User requirement	8
Resources	7

Note:

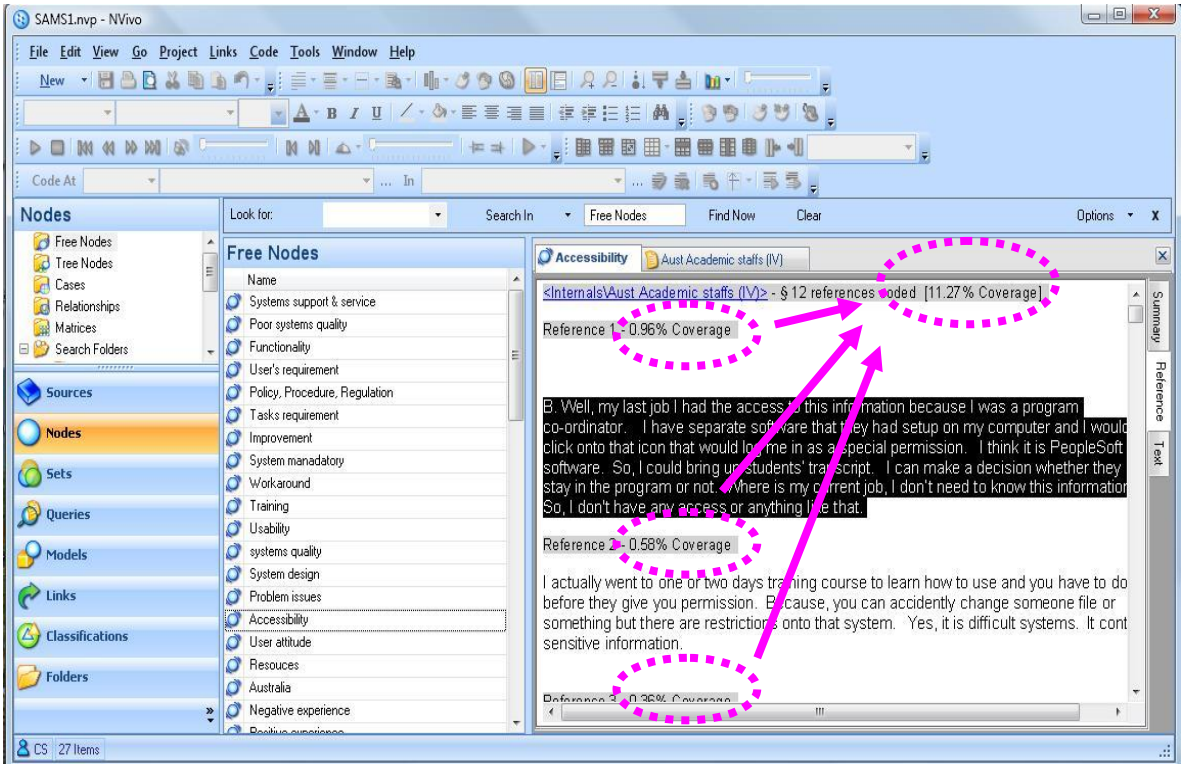
- The concept of adaptation and manual workaround were combined as the workaround.
- The number in each box represented the number of users' group that discussed and responded in the concept (e.g. 5 means 5 groups of user, comprised of: administrative staff: focus group; academic staff: focus group; IS/IT manager: interviews; international student: focus group; administrative staff: observation), also see chapter 3: (Research Sample Size).

Appendix I: Nvivo Output

The percentage of the user's response

Note:

- The number of each concept presented in the percentage (%) which generated from the reference coded of NVivo (text reference).

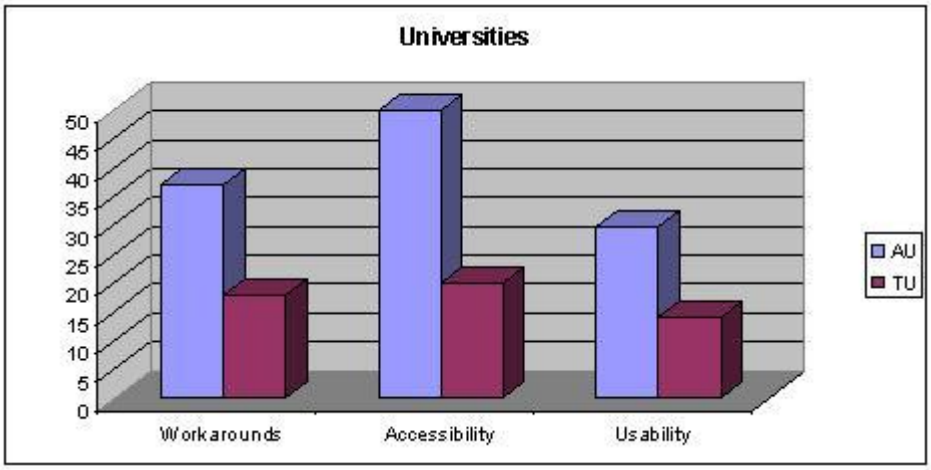


Appendix J 1: University Comparison

Data summaries of the comparative studies (Universities)

University

Concepts	AU	TU
• Workarounds	37.2%	18%
• Accessibility	50%	20%
• Usability	29.89%	14%
The comparative results of universities between AU and TU		



Note:

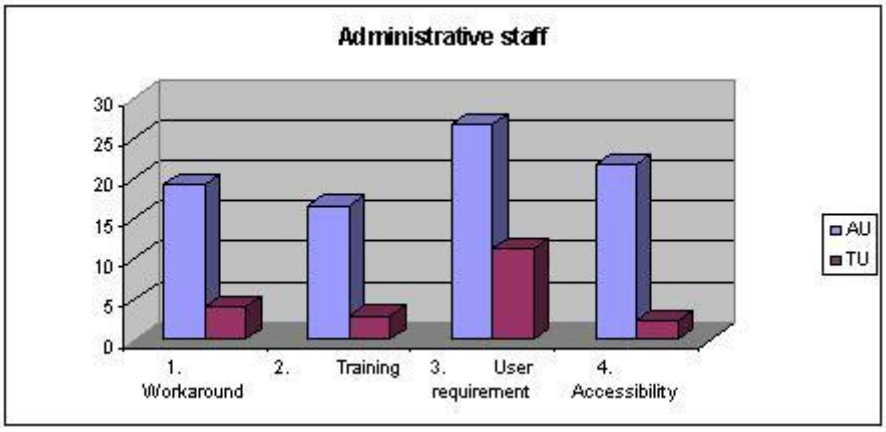
- The number of each concept presented as a percentage (%) which was generated from the references coded in NVivo (text reference), see Appendix I.
- See the section 5.4 for detail “Cross- case Study Comparison (AU vs. TU)”

Appendix J 2: Administrative Staff Comparison

Data summaries of the comparative studies (Administrative staff)

Administrative staff

Concepts	AU	TU
1. Workaround	19.32%	4.21%
2. Training	16.79%	3.00%
3. User requirement	26.68%	11.36%
4. Accessibility	21.81%	2.4%
The comparative results of administrative users between AU and TU		



Note:

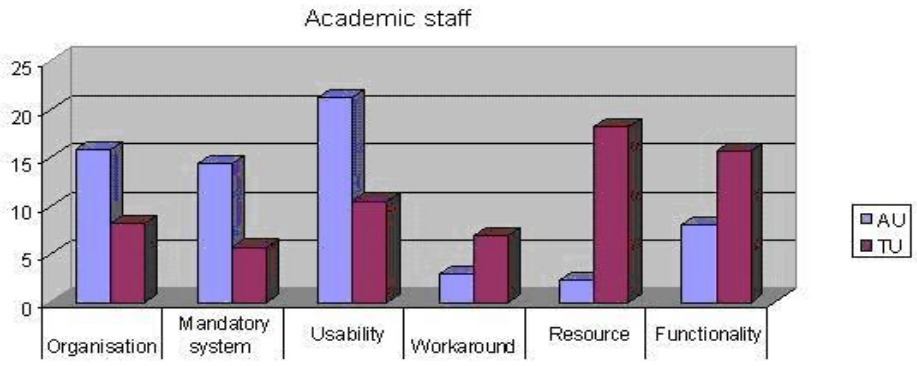
- The number of each concept presented as a percentage (%) which was generated from the references coded in NVivo (text reference), see Appendix I.
- See the section 5.4 for detail “Cross- case Study Comparison (AU vs. TU)”

Appendix J 3: Academic Staff Comparison

Data summaries of the comparative studies (Academic staff)

Academic staff

Concepts	AU	TU
Organisational Policy	15.9%	8.16%
Mandatory system usage	14.38%	5.73%
Usability	21.29%	10.54%
Workaround	2.96%	6.96%
Resources	2.28%	18.29%
Functionality	7.96%	15.65%
The comparative results of academics between AU and TU		



Note:

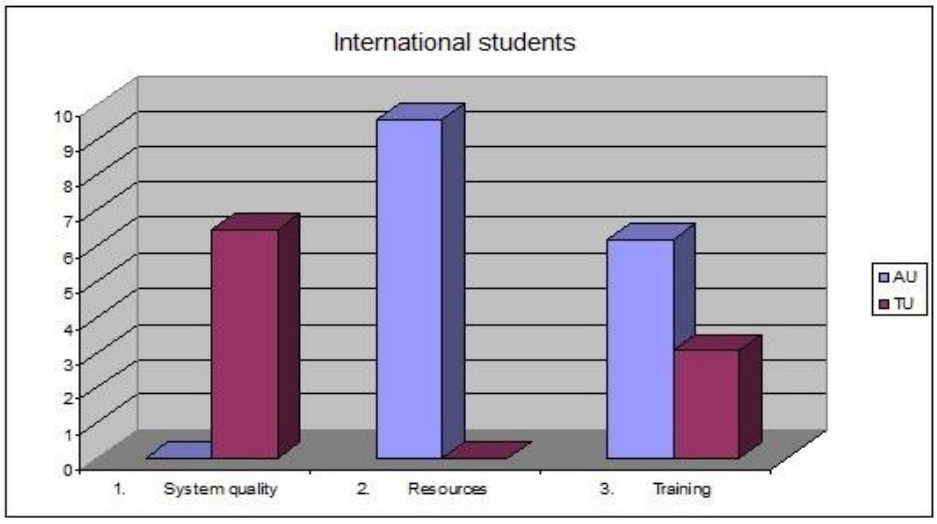
- The number of each concept presented as a percentage (%) which was generated from the references coded in NVivo (text reference), see Appendix I.
- See the section 5.4 for detail “Cross- case Study Comparison (AU vs. TU)”
-

Appendix J 4: International Student Comparison

Data summaries of the comparative studies (International students)

International students

Concepts	AU	TU
1. System quality	0%	6.48%
2. Resources	9.58%	0%
3. Training	6.19%	3.04%
The comparative results of international students between AU and TU		



Note:

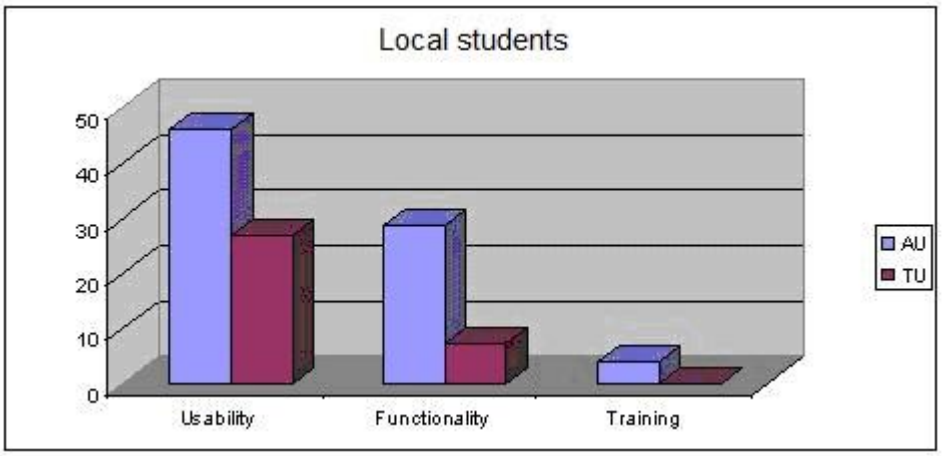
- The number of each concept presented as a percentage (%) which was generated from the references coded in NVivo (text reference), see Appendix I.
- See the section 5.4 for detail “Cross- case Study Comparison (AU vs. TU)”

Appendix J 5: Local Student Comparison

Data summaries of the comparative studies (Local students)

Local students

Concepts	AU	TU
1. Usability	46.05%	27.00%
2. Functionality	28.89%	7.23%
3. Training	3.89%	0%
The comparative results of local students between AU and TU		



Note:

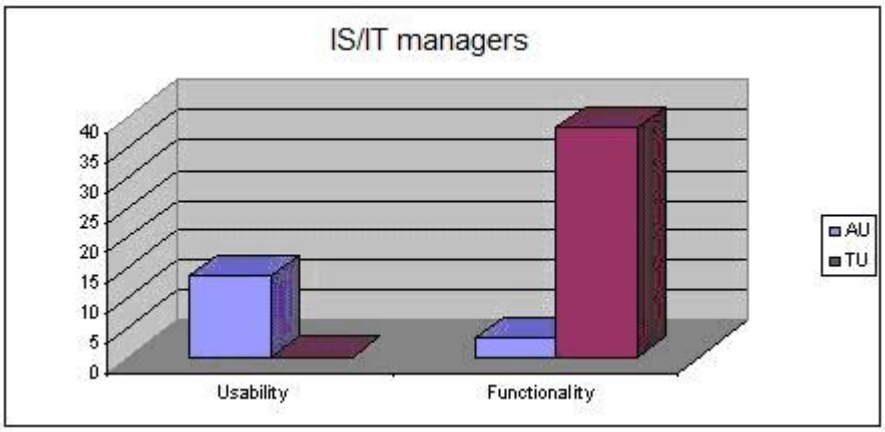
- The number of each concept presented as a percentage (%) which was generated from the references coded in NVivo (text reference), see Appendix I.
- See the section 5.4 for detail, Cross- case Study Comparison (AU vs. TU)

Appendix J 6: IS/IT Manager Comparison

Data summaries of the comparative studies (IS/IT managers)

IS/IT manager

Concepts	AU	TU
1. Usability	13.52%	0%
2. Functionality	3.16%	38.26%
The comparative results of IT/ IS manger between AU and TU		



Note:

- The number of each concept presented as a percentage (%) which was generated from the references coded in NVivo (text reference), see Appendix I.
- See the section 5.4 for detail “Cross- case Study Comparison (AU vs. TU)”

Appendix K: International/Local Student Comparison

Data summaries of the comparison of International and Local Students (AU, TU)*

Concept	AU International Student	AU Local Student	TU International Student	TU Local Student
Poor System Quality	25%	18%	24%	20%
User Requirement	**18%**	**8%**	10%	11%
Functionality	**6%**	**14%**	12%	7%
Task Requirement	7%	5%	10%	6%
Usability	17%	30%	10%	12%
Organisational Policy	4%	3%	8%	5%
System Implementation	4%	3%	7%	5%
Resources	6%	4%	**1%**	**9%**
Accessibility	2%	2%	2%	2%
Mandatory System Usage	4%	3%	3%	2%
Workaround	1%	1%	2%	2%
Training	6%	4%	1%	0%
	100%	100%	100%	100%

Note:

- The number of each concept presented in the percentage (%) which generated from the reference coded of NVivo (text reference), see Appendix I.
- E.g. In Local student (AU), the responded in Poor System Quality multiply no. of all concepts and divide by 100
    a. Poor System Quality $\left[\frac{19.2 \times 13}{100}\right]$ = 24.96 % then round up to 25%
- See the section 5.4 for detail “Cross- case Study Comparison (AU vs. TU)”

Appendix L 1: Thai/Australia User Comparison

Summaries of comparison of the users between AU and TU

AU	**TU**
1. Workaround is encouraged	1. Workaround is not encouraged
2. Policy constrained SAMS access	2. Policy has not affected SAMS access

Administrative user (AU)	**Administrative user (TU)**
1. Workaround is not limited by policy	1. Workaround is limited by organisational policy
2. Inadequate training, SAMS are complex	2. Staff require technical knowledge, SAMS is less complex
3. Accessibility, functionality and usability are the impacts on the users	3. Functionality is the impact on the users
4. Accessibility is constrained by policy	4. Policy is not constrained to user access

Academic users (AU)	**Academic users (TU)**
1. SAMS are not all mandatory	1. SAMS is mandatory
2. Functionality	2. Poor documentation
3. Manual workaround, support by staff	3. Extend functionality
4. Not required	4.Inadequate hardware and facilities
5. Functional constraint	5. Functional constraint, Data misfit
6. Usability	6. Functionality

International students (AU)	**International students (TU)**
1. SAMS is difficult to use	1. SAMS is easier and useful to use
2. Require more information support (resources)	2. Support (resources) is not required
3. Require online, self-training	3. Training is not required

Local students (AU)	**Local students (TU)**
1. SAMS is difficult to use	1. SAMS is not difficult to use
2. The SAMS are not integrated	2. SAMS is integrated, Lack of functionality
3. Require self-training, online support	3. Training is not required

IT/IS manger (AU)	**IT/IS manager (TU)**
1. SAMS has poor usability	1. SAMS has usability feature
2. SAMS lack of usability, SAMS is large and more complex	2. SAMS lack of functionality, SAMS is small and less complex

Appendix L 2: International/Local Student Summary

Summaries of comparison between International Students and Local Students

International students (AU)	**Local students (AU)**
1. SAMS is difficult to use	1. SAMS is difficult to use
2. Require more information support	2. Require more information support
3. Require online, self-training	3. Require self-training, online support

Local students (TU)	**International students (TU)**
1. SAMS is not difficult to use	1. SAMS is not difficult to use
2. Required information support, resources	2. Resource is not required
3. Training is not required	3. Training is not required

Appendix M: SAMS Phenomena Flow Model

The Flows of the Phenomena of the SAMS Usage (The Case Studies of AU and TU), (Developed for Research Purposes only)