



**REENGINEERING THE RESIDENCE APPLICATION AND ADMISSION BUSINESS
PROCESSES AT A SELECTED TERTIARY INSTITUTION**

by

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DECLARATION

I, Loki Manise, declare that the contents of this thesis represent my own unaided work, and that the thesis has not previously been submitted for academic examination towards any qualification. Furthermore, it represents my own opinions and not necessarily those of the Cape Peninsula University of Technology.

Signed

Date

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I wish to thank:

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- Dr Andre de la Harpe for his support and guidance
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The financial assistance (URF) of the Cape Peninsula University of Technology (CPUT) towards this research is acknowledged. Opinions expressed in this thesis and the conclusions arrived at, are those of the author, and are not necessarily to be attributed to CPUT.

DEDICATION

To my Mother and Father
as well as my Grandparents (RIP)

ABSTRACT

Institutions of higher learning are operating in an environment that is continuously informed by the markets and government regulations, hence the need for continuous improvement initiatives in order to remain relevant to the dynamic changes in higher education. The improvements are done by reviewing the course content, operations, and business processes, which includes an application and admission process. This study analyses the residence application and admission process (RAAP). The business processes and Enterprise Resource Planning (ERP) system support the realisation of the application and admission process of the university. The review of the current application and admission process will be based on business processes, business process reengineering, and the business process modelling theory. Therefore, the problem statement for the study is that the impact of information flow during the application and admission of students for residency at the university involves business processes that are inefficient and ineffective. This results in mistakes being made by administrators, and students who are dissatisfied. The study is based on two research questions: Firstly, what strategies can be used to improve the application and admission process of the role players at the selected tertiary institution, and secondly, how does the application and admission process affect service delivery to the students and residence administrators at the selected tertiary institution?

The aim of the study is to explore how the participating students and administrators in the residence application and admission process perceive the efficiency of university business processes. A further aim is to explore how the processes can be reengineered to fulfil the requirements of the students and administrators. The research methodology employed to resolve the problem logically is qualitative in nature. A research paradigm guides the actions of the researcher with regard to the generation and interpretation data, which results in knowledge production. The inductive research approach is well suited for the research strategy. For the purpose of this study, a case study strategy is deemed suitable because of its qualitative nature, and comprehensive knowledge of the university processes is required to understand and address the research problem. The unit of analysis of the study is the university's administrative department business processes. The purposive, non-randomly selected students who applied for residency and the employees of the applicable departments within the university form the unit of observation, which is also a source of data. The data are collected by means of interviews using semi-structured questionnaires, with the samples being non-random and purposively selected. The data collected in the case study are then summarised and categorised into themes. The themes are used to present the "As-Is" and the "To-Be" application and admission process.

Keywords: Business process, reengineering, application and admission process

ABBREVIATIONS

Abbreviation	Description
BP	Business Process
BPM	Business Process Management
BPR	Business Process Reengineering
IS	Information System
IT	Information Technology
EPC	Event-driven Process Chain
ERP	Enterprise Resource Planning
BPMN	Business Process Model Notation
WCA	Work-centred analysis framework

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CHAPTER ONE: INTRODUCTION

1.1 Introduction

Business process reengineering (BPR) in the context of the application process, including residence applications at tertiary institutions (universities), is the primary focus of this research. This research addresses the scenario where an organisation reviews its process, technology and people compatibility with its strategic goals. It also discusses how the application forms are managed and processed within functional university departments such as the Application Office, Faculty Office, and Residence Office, which have a cross-functional dependency. Thus, the importance of understanding organisations is governed by their boards or councils, which require the organisation to improve the quality of their services or products and reduce the cost of providing these services in order to retain its customers (Ashogbon, 2012). This argument is supported by Fisher (2006) in his thesis dealing with similar reasoning from a university point of view. The emphasis of the study is on the competitive nature of tertiary institutions that arises from students expecting superior services from a tertiary institution.

1.2 Problem statement

Students are regarded as customers acquiring knowledge at a university. Equally, universities regard themselves as suppliers of knowledge to these customers. This means the customer satisfaction concept is critical to the survival of the university. When customers' expectations are not met, they will act out (Svensson & Wood, 2007). From a business point of view, the success of the business is determined by how the customers perceive the quality of the service provided (Mukesh, Kee & Manshor, 2009). Thus, organisations need to remain relevant in the competitive business environment and continue to improve their quality of services and products. They should also have the ability to reduce the cost of production to set them apart from its competitors. Ideally, the inherent competitive edge will be higher in the organisation that adopts business process reengineering (BPR) as a strategy tool (Borgianni, Cascini & Rotini, 2015).

The business environment has dramatically increased in complexity, hence the importance of business ability toward iteratively improve organisational processes (Teece, 2007). More importantly, universities have increased their efforts to measure the quality of services provided to students. Students choose their preferred university based on the institution's ability to provide superior quality services to its students (Faganel, 2010). The students' choice is based on their perception of the quality of service that will be provided by the university. Therefore,

the only way the university can stay ahead of its competitors is to constantly monitor the quality of services they are providing (Kontic, 2014). In the same way organisations compete for customers, universities compete for quality students, and by implication, students will choose the institution that is able to respond to their needs effectively. Students expect the university to have the following characteristics: positive attitude from university personnel; university responsiveness to student requests/issues; effective communication with its current or prospective students, followed by access to both information and the university management; and social cohesion with the university (Douglas, McClelland & Davies, 2008).

These characteristics can be classified as administrative functions of the university, which will inform the quality of service provided by the university. The satisfaction or dissatisfaction of students will be informed by the quality of the university's administrative function, which is critical in the overall performance of the university. This argument is supported by Kimani, Kagira and Kendi (2011) who categorise the elements of administrative quality as customer focused, based on the ability of the university to manage records with integrity, mutual respect and politeness, as well as the ability to personalise the services provided, student centeredness, clear communication protocol, and comprehensive systems and procedures (Kimani et al., 2011). University administration processes therefore need comprehensive business processes, and in particular, a clear application and admission process for student residences. Current universities' business processes are not suited for the application and admission of students, and as a result lead to the perception of poor customer services.

The lack of integration of the business processes and IT systems in complex environments has been proven to lead to ineffective and inefficient service (Chen & Manuel, 2010; Lopez-Fersno, 2010; Georgantzas & Katsamakos, 2010). Scholars offer different propositions regarding the integration of management systems and the implementation thereof (Lopez-Fersno, 2010). For an organisation to achieve its goals, the process demands an integration of sequences of related work to accomplish the organisational goals (Cetindamar, Phaal & Probert, 2009). Georgantzas and Katsamakos (2010) argue that the essential elements of the integration of a business system are based on the fulfilment of the needs of customers.

The fulfilment of needs is the same concept as customer satisfaction. The successful implementation of enterprise resource planning (ERP) informs the degree of satisfaction. Shen, Chen and Wang (2016) argue that ERP does increase

the organisation's ability to improve performance and customer satisfaction. The function of ERP systems is to share and deliver data across university departments; this normally involves the Finance Department, the Application Office, faculties, and the Residence Office across the institution (Monk & Wagner, 2013). The integration of ERP systems with business processes usually leads to business process reengineering (BPR) (Malhotra & Temponi, 2010).

The integration of ERPs and business processes alone will not address the issue of inadequate quality of service. It is also important to deal with the issue of the ERP system and business processes as part of the organisational strategy to improve the working culture, structure of the organisation, and business activities. The implementation of these changes will require BPR, which will then enable the organisation to improve its services or productivity (Pattanayak & Royb, 2015). This argument is supported by Dorgan (2013) who posits that that the aforementioned issues can be classified as internal pressure forcing the organisation to update its technology and to automate its processes, which will then result in efficient service delivery. The quality of service relates to customer satisfaction and necessitates BPR (Sajjad, Lee, Kamal & Irani, 2011).

Therefore, this study intends to **evaluate the information flow during the application and admission of students for residency at the selected university, which involves business processes that are inefficient and ineffective. This results firstly in mistakes being made by administrators, and secondly in dissatisfied students.**

1.3 Research aim

The aim of the study is to explore how students and administrators view the university's application and admission process of residency. A further aim is to explore how the process can be reengineered to fulfil the requirements of the students and administrators.

1.4 Research questions (RQs) and sub-research questions (SRQs)

The research questions are structured in following manner:

RQ1: What approaches can be used to improve the application and admission process of the role players at the selected tertiary institution?

SRQ 1.1: What are the users' experiences during the application and admission process at the selected tertiary institution?

SRQ 1.2: What techniques can be deployed to improve the residence application and admission process at the selected tertiary institution?

RQ2: How does the application and admission process affect service delivery to the role players at the selected tertiary institution?

SRQ 2.1: How does information flow during the application and admission process at the selected tertiary institution?

SRQ 2.2: How does information technology support the residence application and registration business processes at the selected tertiary institution?

1.5 Research objective

Taking into consideration the above research questions, the objectives for the research are:

- I. To assess the current residence application and admission process in order to identify the gaps and propose a new process using BPR.
- II. To investigate the extent to which the information system is used in the residence application and admission process (RAAP).
- III. To propose an integrated comprehensive BPM framework required for the residence application and admission process.

1.6 Research methodology

This section presents an overview of the research methodology applied in this study:

- Research philosophy
- Research design
- Research strategy
- Data collection techniques and analysis

1.6.1 Research philosophy

Researchers conduct their studies based on assumptions made about their environment, resulting in the generation of data that are sourced from the study through reason and logic, which forms the basis of knowledge (Collis & Hussey, 2014). This informs what is important to study, what is known (knowledge base), and what will be used to ensure the quality of research (Everest, 2014). Peterson (2014) suggests that the approach to be used for the systematic search of the existence of knowledge, reason, values, mind, and language is informed by the research philosophy. The approach of this study is supported by strong communication and language elements, which are suited for an interpretivist stance;

thus, the focus is on theory development, not testing, and this implies that the study is inductive.

1.6.2 Research approach

The research approach adopted for this study is conceptual and argumentative. In order to improve the understanding of how BPR can be applied in the residence application and admission process, this thesis presents a methodology approach using the case studies of selected universities as well as business process reengineering.

1.6.3 Research strategy

Exploratory inquiry has been adopted as viable strategy to study the experience of applicants and staff with regard to university activities in relation to the application and admission process of students at the selected university where BPR is required to improve the inefficiencies and ineffectiveness of the current application and admission process. The case study strategy allows a researcher to observe and explain areas of interest in more holistic manner (Chong, 2007). Structured interviews were conducted to determine the participants' experience of the application and admission process. Taking into consideration the research problem, the focus is on business activities (workflow) and actors in the process, thereby providing a full view of the effectiveness and efficiency of the system as well as its defects (Liu & Iijima, 2015).

1.6.4 Data collection techniques

Case study techniques have been adopted for this study to provide an adequate, practical account of specific occurrences based on a multiplicity of data sources (Yin, 1994). Hence, it is an appropriate technique to use in qualitative research, as it enables the researcher to gain an in-depth understanding of the phenomenon being studied (Silverman, 2005). Eisenhardt (1989) suggests interviews, archives, questionnaires, and observations to be the most appropriate methods of collecting data in a case study.

For this research, the interview has been selected as the main data collection method; however, the issue of a small sample size was identified, which resulted in the research taking on an aggressive approach to solicit responses from participants. This included sending emails to all relevant participants and making appointments for the interviews. The participants consisted of staff from the Application Office, the Faculty Office, and the Residence Office. After the identification of participants, the interviews were conducted using structured

interview questions. The data collected from the interviews were recoded and transcribed, followed by coding analysis using targeted constructs.

1.6.5 Data analysis

The analysis of a qualitative research design study comprises of three synchronised activities, namely data reduction, data display, and conclusion drawing or verification (Miles & Huberman, 1994). Data reduction assists the researcher in narrowing down massive quantities of data, which are in the form of written texts and transcriptions, into more refined usable data, while the data refinement process involves categorising data. This process assists with projecting the findings that are of relevance to the study, in particular to research questions. This line of argument is supported by Eisenhardt (1989), who places a greater emphasis on theory development from case studies.

1.7 Ethical considerations

Ethics refer to acceptable behaviour that expresses and reinforces important social and cultural values of a society. The acceptable behaviour may be documented on a preferred communication medium by societies who subscribe to similar ethical standards that are translated into rules (Castellano, 2004). Resnik (2011) advocates for honesty, which is important in avoiding fabricating or falsifying collected data, and in protecting the integrity of data sources at all times.

1.7.1 Autonomy

The study has been conducted in line with CPUT's ethical conduct of protecting the confidentiality and anonymity of participants by not disclosing any personal information about them. Secondly, participation was not mandatory; however, it contributed to the development of new business processes for the university as per the aim of the study.

There are ethical implications in terms of a non-random sample of interviewees in the context of the rapport that is established between the participants and the researcher, especially when the researcher is working at the same institution. Although the participants are informed of their rights in terms of participating in the research (i.e. participants may opt not to partake in the study), they may choose to participate for the sake of maintaining good rapport with researcher (Yang, Yang & Chen, 2013).

1.7.2 Beneficence and non-maleficance

Qualitative research focuses on language ability to source appropriate data for the study; however, it also has ethical implications, and the issue of how the narratives

are recoded becomes of paramount importance (verification and validation purpose), which then strengthens the quality of the data collected for the study. The communication skills of the research should be at a level where he/she is able to detect a communication breakdown between him/herself and interviewee (Yang et al., 2013). In an applicant-university relationship where the university provides a service to the applicant, the service should result in more benefit than harm to applicant (Littleton, Meemon, Breen, Paek, Loyal, Ellis & Wan, 2010).

1.7.3 Justice

Resnik (2011) argues that it is important for the researcher to adhere to acceptable behavioural norms in research, which includes but is not limited to honesty and avoiding the fabrication or falsifying of the data collected. Furthermore, the integrity of the data source needs to be protected at all times, and divulging any data that might harm the university and participants under study must be avoided in order to build long term relations based on trust, integrity and fairness.

1.8 Theoretical framework

The framework provides a theory review, which is the fundamental element of the research that enables the researcher to analyse and interpret the data in the context of BPR and RAAP. Chapter Two provides a detailed review of the theory, with the focusing on: i) organisational structure, ii) information technology, iii) business process, iv) business rule, v) business process reengineering, vi) enterprise resource planning, and vii) knowledge management.

1.9 Justification and contribution of the research

Organisations are drastically employing new IT software such as ERP solutions in favour of developing systems internally. These systems are acquired with the aim of improving business efficiency based on specific functional requirements; however, organisations have complex business processes that require the integration of different activities within the organisation for the implementation of ERP, which normally results in reengineering the business process (Sommer, 2011). The importance of BPR is thus that it is one of the methods used to manage business process changes without compromising the implementation of ERP's intended function. It is important to note that BPR is not the only method available for this purpose; the organisation will have to decide on the method most suited for their operational requirements (Shin & Jemella, 2002).

Considering this confusion, which is translated into research gaps in conjunction with current business practices that need to be integrated with the ERP system, this

research explores the application and admission process of students when applying for residency at a tertiary institution from a role player's perspective, focusing on the effectiveness of BPR and information system integration.

1.10 Delineation

This research study is limited to one tertiary institution. Therefore, the result of the study cannot be generalised within the higher education sector. No other university business process other than application and admission is being investigated. Furthermore, non-residence students are excluded from the research because the study is exploring the flow of information between the departments involved in the residence application and admission process.

1.11 Headline findings

Key findings from the literature review include:

- I. The needs of the customers continue to evolve and require the organisation to keep up with these needs.
- II. The organisation needs to adopt a continuous improvement approach to keep up with the needs of its customers, which involves identifying their operational problems and knowing how to address it.
- III. This study has leveraged the business process theory to reengineer the residence application and admission process.

1.12 Organisation of thesis

The thesis is organised as follows: Chapter One focuses on the research background and research problem, which then results in the research questions and objectives being formulated, followed by a high-level research methodology, and finally, the outline of the thesis. Chapter Two deals with the theoretical foundation, followed by a conceptualisation of business process reengineering. Chapter Three focuses on the adopted research methodology, research philosophy, research approach, and research design, followed by the chosen method and theory, and ends with the research strategy, population, and data collection method. Chapter Four presents the results of the study, followed by the analysis, a discussion that includes the ("As-Is") application and admission process and the areas of improvement, and finally proposes a new ("To-Be") process. In Chapter Five, the conclusions, recommendations and a reflection are presented, and the practical implications of the study are indicated.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The information flow during the application and admission of students for residency at the university involves business processes that are inefficient and ineffective. This results firstly in mistakes being made by administrators, and secondly in students who are dissatisfied, hence the importance of organisational performance and a special focus on effectiveness and efficiency. Efficiency is driven by competition and customer expectations, requiring the organisation to be flexible and to streamline its operations and cross-functional integration of business processes across departments (Sidorova & Isik, 2010). Effectiveness refers to the ability of the organisation to complete its tasks and achieve its goals as per the needs of their customers. Efficiency refers to the ability of the organisation to achieve its goals using minimum resources (Brooke, 2013). These two concepts are critical in addressing the research problem in the context of inefficiency and ineffectiveness. The focus is on how the organisation endeavours to satisfy customer requirements using adequate resources.

BPR has been implemented by a number of organisations since the 1990s; however, the implementation of BPR has resulted in methodological and technical issues relating to the effectiveness of process modelling for BPR, hence the importance of developing a process modelling framework to redesign organisational processes (Kim, 1995). The first step in the development of a framework would be to understand the organisational anatomy, thus the need to analyse organisational activities, which will then provide representation of how the organisation manages its knowledge systems to achieve its organisational goals (Koubarakis & Plexousakis, 2002). Trkman (2010) argues that the organisational process has complicated characteristics because it cuts across different hierarchical levels and systems. The focus of this chapter will be based on the following:

- The organisation structure should support business processes
- Information technology should support business processes
- Business processes should result in improved service provision

The next sections will be dealt with in the context of complex university challenges that require the re-evaluation of its processes. In some cases, the challenges are as result of the inadequate description of university activities. Tsvetanov (2008) argues that the re-evaluation or review of university business processes requires a detailed description of university activities pertaining to application and admission of students, which means a clear definition of the roles and responsibilities of all

stakeholders involved in these processes. Thus, the importance of business process reengineering becomes crucial in the turnaround strategy of university administrative processes. It is important to understanding that BPR is preceded by business process analysis and review. Its purpose is to improve the integration of all organisational activities with the view to improve productivity or service provision (Silvestro & Westley, 2002). The intent of the business processes is to have visual representation of organisational processes in order to identify problems and areas of improvement (Tsvetanov, 2008).

2.2 Organisational structure

Definition

“The formal structure of authority calculated to define, distribute and provide for the co-ordination of tasks and contributions to the whole which is very essential for fulfilling the objectives of an organization” (Nyarko, Dorkenoo, Semordey & Agbanu, 2016:2)

Discussion

The issue of organisational structure is a challenging topic because of the following argument: literature suggests that organisational structure should be informed by organisational strategy, and the role of the strategy is to outline organisational objectives and goals. Koubarakis and Plexousakis (2002) present a model that defines the role of actors within the organisational structure; these roles are guided by an organisational policy that stipulates the role and responsibilities of staff members and their respective units within the organisation. The higher education sector has complex hierarchical structures that pose many problems as alluded to by Tsvetanov (2008):

- Faculties are managed as business units; as a result, departments within the faculty adopt the same model, meaning they are independent structures of the university
- Each faculty has different admission requirements
- Communication between faculties and support services is not easy

These problems result in weak management of institutional resources, leading to units focusing only on ticking off their activity boxes, and this means administration processes are unsatisfactory. By adopting business model concepts, the organisation focuses on work force positions, its role, and the composition of the team in relation to their line manager’s position in the workplace structure. The purpose of the organisational structure is to deal with the structural allocation of organisational resources such as staff, equipment, and the budget, aimed at delivering the required services or products. The role of staff in the organisation is to

facilitate the production of the required service or product, while the equipment enables staff to perform their intended function. The budget enables the organisation to acquire the needed equipment and pay for the services of staff employed by the organisation (Weske, 2007).

Organisations do not have a fluid structure; they have a static structure, which requires a clear understanding of organisational dynamics in order to deal with the changes required for the organisation to survive in a competitive environment. Organisational stagnation is informed by the culture of the organisation, meaning, does the organisation embrace change and how is change managed? The introduction of information systems surely challenges the current state of the organisation; hence, change will naturally be resisted by some of the staff members within the organisation (Besson & Rowe, 2012).

Hammer (2007) further expatiates the argument of a need for organisations to have four critical capabilities (leadership, culture, governance and expertise) that enable an organisation to determine the required resources and skills for the management work activities within the process.

Leadership: Refers to the ability of the organisation's management to develop vision for the organisation and to motivate staff to work towards achieved vision (Robbins, 2003). Yuki (2013) defines leadership as a process of persuading others to agree on what needs to be done and the manner in which to do it effectively, and individuals in the organisation to work towards achieving shared objectives. Leadership therefore also refers to the creation of an environment that enables people in the organisation to work towards achieving organisational objectives (McShane & Von Glinow, 2009).

Culture: In the organisation, culture refers to how members of the organisation carry themselves with respect to organisational values and belief systems. In a comparative environment, the focus is on innovation, financial discipline, and resource consciousness (Rosemann & Vom Brocke, 2010).

According to Hartmann (2006), the importance of a positive culture is to promote innovative behaviour among the members of an organisation, which is normally associated with work appreciation and commitment. The opposite is also true – organisations having a culture that is not consistent with the envisaged requirement of customers usually have processes and departments that are not in synergy. They have disconnected work activities that are not supporting the organisational goal (Peppard, 2000).

Governance: Refers to how organisations structure the roles of its employees in terms of their roles and responsibilities. The importance of governance structures clearly defines the level of authority assigned to employees and assists the organisation with decision making processes, meaning it defines which decision can be made by an employee at a particular level (Rosemann & Vom Brocke, 2010). In the context of business processes, the role of employees need to be clarified and process owners need to be identified. In a complex organisation with different functional silos, the integration of business processes becomes more critical to ensure that all processes are geared towards achieving organisational goals.

Expertise: Refers to the appointment of knowledgeable personnel to drive or manage the organisational work activities (including but not being limited to people management, change management, process design, and process improvement). Expertise further refers to the ability of the organisation to transfer knowledge from one employee to another, which is also known as knowledge transfer. Škerlavaj, Štemberger, Škrinjar and Dimovski (2007) reiterate Hammer's (2004) affirmation that organisations are forced to reengineer their business model and business processes to align with the competitive nature of the business environment they operate in.

Business leaders or managers are mandated by their boards to ensure business is able to function optimally within their competitive environment. Therefore, organisations develop their structure after they have developed an organisational strategy. In the context of this study, the structure will embrace creativity, innovation, and flexibility (Ahmad, Francis & Zairi, 2007).

2.3 Information technology

Definition

“The use of any computers, storage, networking and other physical devices, infrastructure and processes to create, process, store, secure and exchange all forms of electronic data” (Nelson, Ojebuyi & Salawu, 2016:65)

Discussion

Information technology (IT) has revolutionised how organisations conduct their business as enabler of achieving organisational goals facilitated by its capabilities, which include software, hardware, and information systems that facilitate the activities within the organisation. Each organisation has its own generic requirements for IT aimed at optimising its functions by automating processes (Rosemann & Vom Brocke, 2010). IT was historically used to automate work processes, which began in the late 1960s and exploded in the 1970s with special

focus on back office operations such as bookkeeping and document management that were made possible by automating the back office (Harmon, 2010). Technology is usually introduced into an organisation with the goal of improving organisational processes that will result in efficient organisational services. IT is able to support organisational processes only when employees are able to operate it. When IT is aligned to organisational processes, it is referred to as a functional fit because of the ability to assist the organisation in functioning effectively and efficiently (Seddon, Calvert & Yang, 2010).

Developments in IT have consequently resulted in improved communication between the organisation and its customers. More importantly, it is facilitating inter-departmental data sharing. Depending on the nature of the risks associated with data on the system, the organisation can set up security control to manage access to business information systems. Successful IT implementation is determined by the ability to improve the quality of data used by the organisation for decision making, and by the ability to integrate business processes across different departments within the organisation (Attaran, 2004). IT refers to essential organisational tools used to facilitate the processing of information relating to a required task, for example, information processes executed by staff and aided by computers to create, process, manage, and provide information that are required for the task. Information processes cut across organisational structure in the form information systems (Georgakopoulos, Hornick & Sheth, 1995); hence, it is vital for business process reengineering. It provides seamless, flexible, and easy-to-communicate work processes, thereby changing the way the organisation runs its business (Attaran, 2003).

2.4 Business processes

Definitions

“Consist of a set of activities that are performed in coordination in an organisational and technical environment. These activities jointly realise business goals” (Weske, 2012:5)

“A synergy of interconnected organisational events, activities and decision points at different levels of the organisation, which result in desired organisational outcomes” (Dumas, La Rosa, Mendling & Reijers, 2013:4).

Discussion

An organisation uses business processes to execute its strategy. It provides the organisation with a well thought out methodology to manage its business processes in order to achieve strategic goals (Bandara, Chand, Chircu, Hintringer, Karagiannis,

Recker, Van Rensburg et al., 2010). Business processes can be described as workflow, which is relevant at a conceptual level to analyse business processes. The analysis involves the evaluation of the business processes in terms of the process requirements, both human and technical, which is intended to satisfy specific market requirements at a conceptual level (Georgakopoulos et al., 1995). A business process can also describe the organisational activities, implemented as either information or material processes (Medina-Mora, Winograd, Flores & Flores, 1993). All businesses have a procedure to deal with work- or goal-oriented activities that are performed or should be performed. In some cases, the performance is routine, manual, or automated. Regardless of its mode, the procedure is called a process. Thus, the process refers to the work activity performed by individual employees, which could be either routine or creative, and should be viewed in the context of holistic work activities within the organisation, aimed at creating value (Hammer, 2007).

An organisation uses business processes to execute its strategy; it provides the organisation with a well thought out methodology to manage its business processes in order to achieve strategic goals (Bandara et al., 2010). Business process mapping becomes vital at the operational level, because it enables the organisation to define the role and expected outcome of all the organisational resources clearly; more importantly, it addresses how work activities are arranged within the organisation.

After mapping its work activities in terms of business processes, the organisation can identify areas of improvement/review for each process within the organisation. The intent for improvements is aimed at increasing the product or service quality and maximising organisational resources. Thus, business process improvement/review is also referred to as business process engineering, which involves identifying the legacy business process and the new business process, followed by automating the business process through the introduction of computers and information systems (Georgakopoulos et al., 1995).

Numerous studies have been carried out on business processes. Ashogbon's (2012:9) approach starts with defining a process: "Every activity performed with the aim of achieving a purposeful end result happens in stages and processes. They all start from somewhere and end somewhere, and often with several other sub-activities in between that ensure the expected outcomes are achieved". Figure 2.1 explains a simple process analogy aimed at transforming resources (materials,

technology, and manpower) with a level of control and value-added activities (measurement and operation) into a desired output.



Figure 2.1: Process analogy
(Source: Ashogbon, 2012:9)

Organisations have activities that are performed by various employees in different departments having different levels of access to information systems. Hence, individual responsibilities and roles within the department need to be defined clearly using business rules and business processes (Smirnov, Dijkman, Mendling & Weske, 2010). These activities take on different forms and depend on organisational structure, IT systems, and administrative functions. Figure 2.2 shows how the business process has been conceptualised.

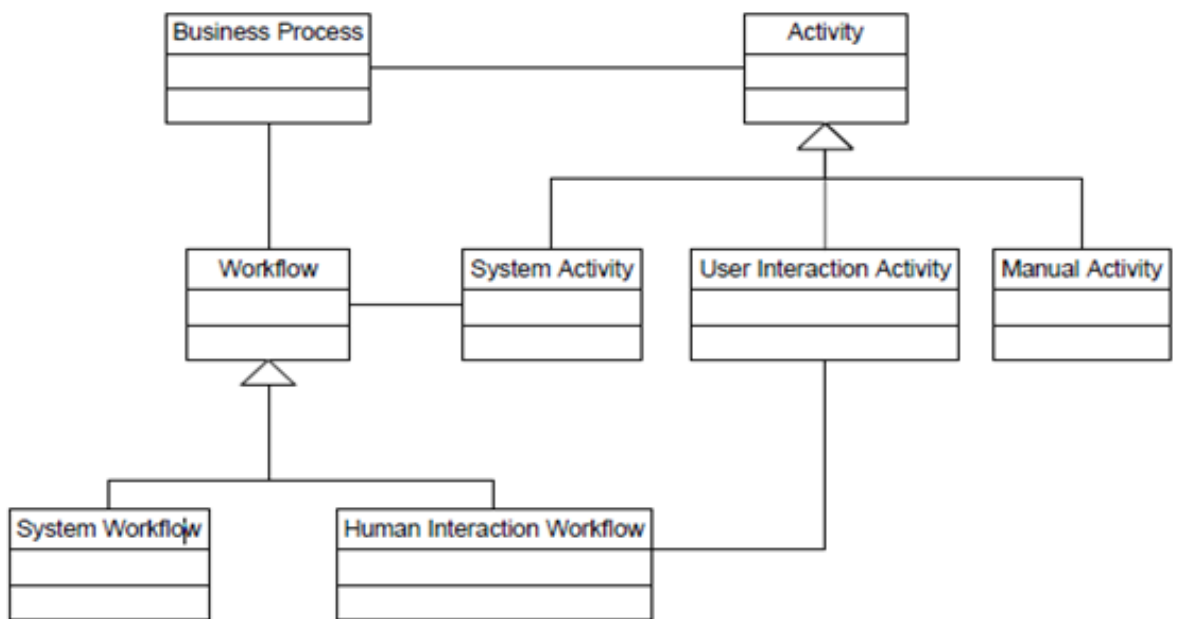


Figure 2.2: Business process: conceptual model
(Source: Weske, 2007:74)

System activities: involve automated activities, which are based on business rule concepts, namely states, events, conditions, and signals:

- States focus on mirroring the standing of the object in question at the given point in time
- Events refer to organisational or individual actions carried out internally within the organisation; they are policy driven and focus on a high level definition of how different aspects of work should be carried out
- Conditions refer to the development of criteria for moving the object in question from one state to the next organisational event; it could define when the object will become fully automated, resulting in signals (called triggers) being developed to initiate action
- Triggers are not only internal; it could also be external, for example, a customer files a complaint, then the client service department engages the production department on the query, which triggers some activity (McDermid, 2003)

User interaction activities: refer to interfaces between users (knowledge workers) and computers. Weske (2007) argues that the process needs to be connected to the back-end process system that stores the captured data, and makes the data available when the need arises.

Manual activities: refer to the activities of an organisation that are not supported by its information system, for example, the transportation of products from the production line to a storage facility. Once the organisation functions optimally, it is assumed that the business processes are fully developed. The business process development stage will be determined by the ability of the business process to execute business rules in order to achieve organisational goals based on organisational activities (Wang & Wang, 2006). The management of business processes becomes imperative because organisations function within a competitive environment where decision making is a critical part of business operations. It is important to understand that business processes will be designed or engineered for different people in the organisation based on their level of authority, for example, at a low level, business processes will be very prescriptive and more detailed, while at senior level, it will be high-level and less detailed. Organisations have to identify information requirements for their business process reengineering based on need and the intended function of the business process (Aguilar-Savén, 2004). The introduction of information systems into the organisational business processes may result in organisations reviewing their business processes, which is known as BPR. In this study, business process refers to the application and admission of students

into the university, focusing on resources (staff, IT systems) as well as on controls referring to the minimum admission requirements needed for the decision making process.

2.5 Business rules

Definition

“A business rule is an explicit state change context in an organisation which describes the states, conditions and signals associated with events that either change the state of a human activity system so that subsequently it will respond differently to external stimuli or reinforce the constraints which govern a human activity system” (McDermid,1998:63).

Discussion

The application of business rules is generally driven by the integration of business processes into the ERP system in the context of organisational structure. Generally, business rules are meant to assist decision makers with adequate information required to make decisions, hence the need for clear regulation and policies forming the basis of business rules. These rules are also essential for the organisation’s knowledge system. Business rule and knowledge systems enable the organisation to align its decision making processes in a chronological manner, depending on the line function authority of that particular department within the organisation (Charfi & Mezini, 2004). This reasoning provides a general framework for the understanding, independence and synergy of departmental autonomy with regard to decision making and functionality, thus providing an interdependency relationship between organisational departments (Zur Muehlen & Indulska, 2010). It also translates into knowledge integration between organisational departments in respect of how the decision making process is regulated (Spies, 2010).

2.6 Business process reengineering (BPR)

Definitions

“Is the fundamental rethinking and radical redesign of appropriate business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service and speed. Such redesign and pace of implementation to be suited to the individual organisation, contingent upon the ‘gap’ between the present state of the organisation’s structure, culture and IT infrastructure, and the state required to implement the new business processes successfully. An ideal state would be one in which BPR was an ongoing, proactive process” (Eardley, Shah & Radman, 2008:634).

“A radical redesign of processes in order to gain significant improvements in cost, quality, and service” (Ozcelik, 2010:7)

“Reengineering is the fundamental rethinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, service and speed” (Hammer & Champy, 1993, cited in Khan, 2000:100).

Discussion

For the past decade, organisations have been changing their business processes with the view to improve the competitiveness of the organisation. This process is facilitated by the introduction of business process modelling techniques (Terziovski, Fitzpatrick & O'Neil, 2003; Vergidis, Tiwari & Majeed, 2008). The study of Terziovski et al. (2003) provides intervention tools for improving business performance to organisations intending to embark on BPR. Improved performance will inevitably result in profitability. Mersha (2004) in his thesis advises practitioners to avoid predetermining the outcome of business process reengineering.

It is important to start the reengineering process with identifying the business objective, followed by how the business will achieve its goal. In the context of higher education, the reengineering narrative is similar; however, Mekonnen (2011) encourages higher education institutions (HEIs) to review their processes in order to take advantage of new methods, technologies, and knowledge development that will lead to more productivity, which will mitigate the recurring pressure of requiring HEIs to operate efficiently and effectively.

2.6.1 BPR framework

Understanding the ERP system will result in possible BPR. Reijers and Mansar (2005) argue that BPR implementation should be based on a clearly defined framework. The framework is a generic or universal concept structure that can be applied in different business environments. Terziovski et al. (2003) argues that the framework is a theoretical basis for the development of a model with the following categories (five component parts):

- Strategy
- Processes
- Customers
- Information technology
- Performance

Literature provides several frameworks and business process analysis models that will be discussed.

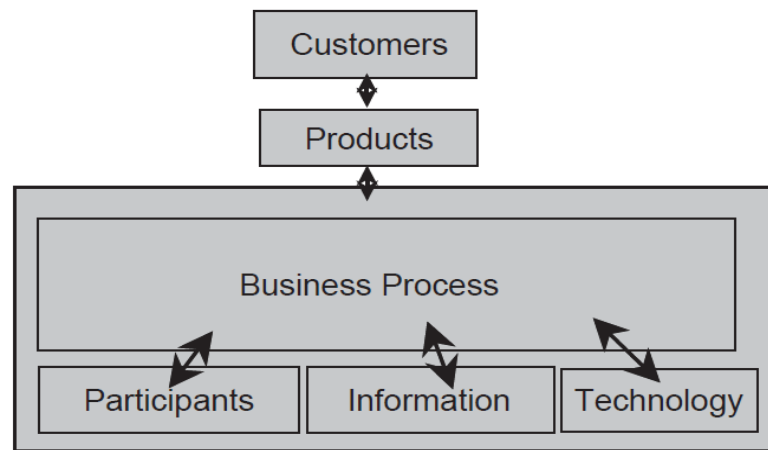


Figure 2.3: Work-centred analysis (WCA) framework
(Reijers & Mansar, 2005:292)

The business process framework requires clearly defined design specifications, which is supported by Alter (1999, cited in Reijers & Mansar, 2005) who suggest that work centred analysis consists of the following elements:

- The internal customers, who are part of the institutional structure, while external customers are not part of the institutional structure
- The product or service, referring to the niche area for the institution
- Business process steps, referring to activities that involve the production of the service or product
- The participants in business processes, referring to the role and responsibilities of staff involved in the process
- Knowledge in the form of data and information, required in business processes
- Technology that enables business processes

The links between these elements are represented in Figure 2.3. This process moves away from the traditional hierarchal and silo based process into a customer centric business process where customers form an integral part of the business process instead of being part of the functional hierarchy (Weerakkody, Janssen & Dwivedi, 2011). Furthermore, Kwahk and Kim (2009) argue that business process reengineering often cuts across departmental boundaries, and it involves various departmental units within the organisation. Each department has its own separate operational activities that contribute to an overall organisational goal; however, they have an interdependent relationship with each other.

This study focuses on the role players (participants) involved in the application and admission of students, while customers are represented by the applicants who can

be either a parent or a prospective student. Based on the aforementioned, this study focuses on the residence application and admission process.

2.6.2 BPR techniques

2.6.2.1 Process visualisation

Process visualisation techniques are intended to cultivate a better understanding of the organisational processes and how the different functions within the organisation interface with each other; this could be in the form of system users within the organisation. The interface involves defining information and knowledge inputs for each function in the process aimed at producing the required outputs (Beckmann & Krause, 2013). O'Neill and Sohal (1999) found a number of techniques that can be used for reengineering business processes. After BPR, initial uncertainties were addressed regarding the suitability of BPR techniques. Authors and consultants alike have pursued the use of many different tools in the search for the best engineering application. These tools and techniques are discussed next.

2.6.2.2 Business Process Modelling (BPM)

BPM is an analytical representation of organisational business processes (Brown, Recker & West, 2011). BPM is generally supported by a number of approaches, which include but are not limited to data-focused or object-oriented approaches taken to refer to diagrammatic or other notations (Giaglis, 2001). As discussed in section 2.4, business processes are activities in an organisation that have different properties, which are informed by the nature of business. Thus, it is important to have proper management tools for managing processes, which could be manual or automated. In order to manage the interrelations between processes and systematically document how the organisation operates as a whole, organisations often adopt the business process modelling approach and start modelling their processes in the form of process models (Malinova, Leopold & Mendling, 2014). It is challenging to classify languages in a singular dimension line because they normally cut across numerous dimensions (Mili, Jaoude, Lefebvre, Tremblay & Petrenko, 2004). Modelling language is the representation of business processes showing a relationship between the activities (work done within the business) and events (describing actions that happen atomically) of the process (Leopold, Mendling, Reijers & La Rosa, 2014). A process model visualises the process steps by providing a diagrammatic representation of a singular process (Malinova et al., 2014).

The business process life cycle comes with varying problems for the organisation, such as how the organisational IT infrastructure fits into the business processes.

Because of these challenges, organisations put a rigorous effort into improving their business processes, hence the importance of the integration of business processes and technology, as they are interdependent of the requirements (Trkman, 2010). Furthermore, Weske (2007) argues that BPM is done during business process design, which is normally based on the survey of selected organisations; the results are analysed to identify problems, and recommendations are used as business process improvement activities. The model processes are verified by participants, done through presenting the business process to the stakeholders/participants who provided the information. This process ensures that the business process being modelled represents a true reflection of the business process at that point in time. Secondly, it allows stakeholders/participants to identify areas of improvement.

Business process modelling research has proposed a wide variety of approaches, which, at the extremes of the spectrum, includes the declarative and the imperative modelling paradigms, commonly used in process modelling.:

- **Declarative:** the focus of this approach is on the process required to achieve organisational goals. However, the process is not prescriptive; it simply provides operational parameters, a set of business rules, and the integration of organisational activities that will enable the attainment of organisational goals
- **Imperative:** this process modelling approach focuses on providing a precise definition of the control flow of the business process in a graph-based process modelling language.

The basic constructs of graph-based process modelling languages are activities and the control flow dependencies between them, which are represented as nodes and directed arcs, respectively. Several graph-based process modelling languages offer a set of additional constructs, for example, events, data objects or compensation associations. Devillers (2011) proposes a business process modelling framework in the IT environment, which basically presents the following modelling languages: flowchart, Petri Net, behaviour trees, Unified Modelling Language (UML), object-role modelling, event-driven process chain, and business process management notation (BPMN). In the next section, the flowchart will be discussed.

2.6.2.3 Flowchart

The BPM tool that most people are familiar with is the flowchart. Flowcharts are used to depict activities (jobs) within the organisation, synchronising the movement of activities from left to right. The movement is intended to illustrate operational

steps required for value creation. Flowcharts are useful to identify decision points and parallel activities in a process (Daines III, 2011).

The importance of flowcharts is supported by their ability to represent organisational business processes through identifying the gaps in management tools that are required to ensure the efficient management of the organisation. Flowcharts focus on the role of users in the organisation by identifying the sequence of activities that are required in business processes. Flowcharts are particularly popular in IT and auditing projects because of their ability to identify internal control weaknesses (Bierstaker, Hunton & Thibodeau, 2009).

2.6.2.4 Petri Net

The Petri Net is usually selected to demonstrate the six dimensions of modelling. There are other types of models available; however, Petri Nets are more widely used than other models. Petri Nets are bipartite directed weighted graphs which could also be defined as a network consisting of two types of nodes called places (drawn as circles) and transitions (drawn as rectangles), connected by arcs to form a network. Places are exclusively connected to transitions and *vice versa*. Depending on the definable properties of a Petri Net, a place can be marked by one or more tokens (Fishwick, 2012).

Petri Nets are used to analyse organisational activities based on either a structural analysis or a reachability graph analysis (Li, Hu & Jeng, 2004). The development costs of Petri Nets have grown extremely fast over the past few years considering the net size. The distinguishing factor of Petri Nets is their ability to detect good behavioural properties of the modelled system, which are essentially deadlock-freeness or liveness (Li, Wu & Zhou, 2012). Nets have important suitable behavioural properties called liveness. This resembles local deadlock situations. In Petri Nets, liveness is associated with the satisfiability of siphons (a subset of places that are not marked does not get new tokens) (Li et al., 2004). Yen and Yu (2004) support this view by arguing that “dependable systems are often associated with properties such as safety (‘something bad never happens’), liveness (‘something good eventually happens’), fault-tolerance (error detection, recovery and masking), etc. The safety property requires that undesired or failure states be avoided at all times during the course of a computation”. Petri Nets consist of basic components called places, transitions, and arcs. In bipartite graph format, they mainly have two types of nodes, namely places and transitions. Circles are used to represent a pictorial display of places, and rectangles represent transitions. Figure 2.4 provides a pictographic representation of Petri Nets, consisting of two places

represented by P1 and P2 and one transition represented by T2. It is important to note in this example that the arcs are connected to a place and transition, or *vice versa*. The system being modelled will inform how the places and transitions are interpreted (Gehlot & Nigro, 2010).

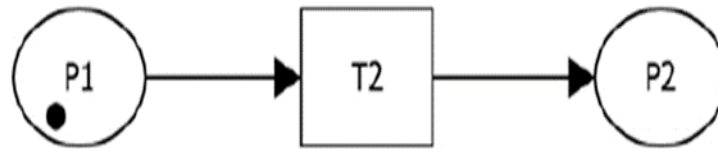


Figure 2.4: Basic Petri Net configuration
(Source: Gehlot & Nigro, 2010:105)

2.6.2.5 Unified Modelling Language (UML)

“UML is defined using a meta-modelling approach. Meta-model is used to analyse, construct and develop the frames, rules, constraints, models and theories, while a model is defined through the instantiation of model elements defined in a meta-model. The main purpose of a meta-model is to explain and define the relationships among the different components of the applied model itself using processing language. This meta-modelling approach can be applied in another models or system depending on specifications” (Guardia, Vêncio & De Farias, 2012).


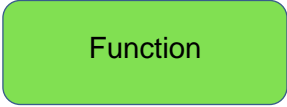

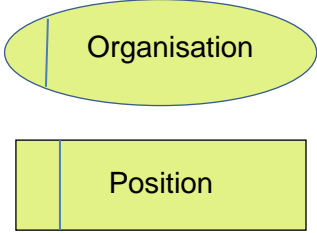

UML is an object-oriented language based on a semantic underpinning that supports notation; it is generally used to model complex systems. UML exists on a higher conceptualisation level; however, it is not a programming language. UML has the ability to automate and translate programming languages such as Java and C++. The latest version of UML has the ability to support more than thirteen diagram styles, such as class, behaviour, and interactive diagrams (Beijnum, Widya & Marani, 2010). The earlier theory supports the reasons for general acceptance and the use of UML based on the clearly defined semantic modelling concepts. Additionally, UML does not conform to traditional modelling methodologies; it is based on supporting tool techniques (Guardia et al., 2012).

2.6.2.6 Event-driven process chain

There are different types of business process modelling methodologies, distinguished by their respective notation. The event-driven process chain (EPC) modelling technique is the most frequently used because it follows a basic contract that can be used to represent the function and activities of the organisation (Devillers, 2011). The basic structure of an EPC is clearly defined and presented by van der Aalst (1999) who states that it consists of functions, which are activities that

need to be executed. Events are represented by a hexagon, applied to represent conditions before/after a function, and connectors join or split the process flow between the elements and represent the process flow. To emphasise the point, EPCs consist of events, functions, and control flow connected by arcs. Events represent circumstances or conditions of a function, while functions describe changes in a process from the starting point to the end result, and connectors are represented by AND, OR or XOR (La Rosa, Dumas, Ter Hofstede, Mendling & Gottschalk, 2008).

Table 2.1: Building blocks of event-driven process chains

Event	
Function	
Connectors	
Organisational aspects	
Flow	

As alluded to earlier, the business process starts with the input and the end result is the output. The EPC's modelling input is in the form of a 'state and process' (events and functions), which can also be presented in the form of tokens. The state and process have at most one incoming and one outgoing arc (Van der Aalst, 1999; Kühne, Kern, Gruhn & Laue, 2010). Furthermore, the EPC as modelling language can be used to model business processes. The modelling requirement is based on the operational requirements of the business, with the view to improve business efficiency (Van Dongen, Jansen-Vullers, Verbeek & Van der Aalst, 2008). It is for this reason that the EPC is a useful technique to model the current residency

application and admission business process, which will be analysed with the view to improve current business processes.

2.6.2.7 Business Process Management Notation (BPMN)

Organisations usually acquire or engage in the development of new business applications based on the needs of the business in order to remain relevant in the market. The need is informed by the fact that the improved business process will result in improved efficiency. It is against this background that business processes continue to evolve. The complexity of a business process informs the requirements for BPR, which will be done using BPMN to model changes in the business process. As BPMN is evolving, developers continue to develop new versions of BPMN, with the markets eagerly awaiting the release of the extension of BPMN to BPMN 1.1, and soon to be released BPMN 2.0.

The BPMN diagram is designed in a way that users can easily use and understand the application (Fernández, Palacios-González, García-Díaz, G-Bustelo, Martínez & Lovelle, 2010). BPMN usually uses a graphic representation of the flow of the business processes of the organisation. It is represented by activities that are captured within boxes. These activities are in the form of nodes and arcs, and the arcs are defined as temporal and logical. Activities are explained by brief text labels in a verb-object style (Mendling, Reijers & Recker, 2010). Activities can further be categorised into nodes (flow objects, swimming lanes) and arcs (connectors). Furthermore, Pourshahid, Amyot, Peyton, Ghanavati, Chen, Weiss and Forster (2009) provide a framework for the basic maintenance and modelling of nodes and arcs in the following form: sequence flow, roles, activities, events, and process hierarchies.

2.7 Enterprise Resource Planning (ERP)

Definition

“The ERP system is an information system that integrates business processes, with the aim of creating value and reducing costs by making the right information available to the right people at the right time to help them make good decisions in managing resources productively and proactively” (McGaughey & Gunasekaran, 2007:24).

Discussion

Business information systems require the integration of IT systems with different sources of data such as search engines, databases, data mining tools, and document management systems, making it possible to have a fully integrated interface portal (Sullivan, 2004). Thus, the importance of ERP is that it is a software

system with the capacity to integrate different aspects of the organisation's operations such as marketing, finance, human resources, and manufacturing. The focus of the system is to increase productivity by ensuring that production is done effectively and efficiently, resulting in the reduction of production costs and an increase in customer service and satisfaction (Antoniadis, Tsiakiris & Tsopogloy, 2015). Notwithstanding, the introduction of ERP in the organisation will not automatically gain a competitive advantage; most organisations have complex processes and operate as silos, hence the importance of integrating business process with the IT system supported by the ERP system (Kocaoglu & Acar, 2015). Kocaoglu, Acar and Yilmaz (2014) emphasise the capacities and benefits of the ERP systems offered to the organisation, and it is in line with the aforementioned argument which states that it has the ability to process data fast and accurately. The processing of data can involve data capturing and data mining in real time.

ERP has the capacity to integrate all functions within the organisation, which normally comes with added responsibilities regarding the issues of security and system integrity. For HEIs, the ERP system plays an important role in the administration process of the institution by integrating the financial system, academic administration, residence system, and space system. Correct implementation of the ERP system improves the effectiveness and efficiency of institutional processes, and in some cases, the institution might need to reengineer their business processes (Davenport, Harris & Cantrell, 2004). ERP systems form an important part of this study where the emphasis is on the value added by the ERP system in the form business process automation and the integration of different departmental functions within the organisation.

2.8 Knowledge management

Definition

“Knowledge management is an approach to discovering, capturing, and reusing both tacit (in people's heads) and explicit (digital or paper-based) knowledge as well as the cultural and technological means of enabling the KM process to be successful” (Records, 2005:2).

Discussion

The importance of knowledge management (KM) cannot be overemphasised. Theory indicates that the number of BPR projects is successful because of the integration of organisational improvement techniques and the holistic view of organisational activities, meaning, if there is no synergy between different organisational units, the overall process will be compromised, thereby resulting in inefficiencies in terms of the overall performance of the organisation. Thus, it is

important for organisations to develop skills internally that will enable the staff to identify opportunities in every organisational problem (Kyupova, Rees & Penev, 2009). O'Leary (1999) indicates that for an organisation to be able develop its own knowledge base, it should start by understanding the nature of knowledge that is collected, modernised, and disseminated to achieve organisational goals. The knowledge base is used to provide knowledge about customer services, which could be in the form of artefacts to support business process reengineering. This argument is also supported by Records (2005), who suggests that for an organisation to develop knowledge management systems, they need to know what constitutes knowledge within their organisation, taking into consideration the general practise of using the terms "interchangeable data", "information", and "knowledge". Records (2005) is in agreement with the general definition, which is stated as follows:

- Data are statistical facts captured and required for analysis, generally generated by a database
- Knowledge is generally acquired through working with data, facts, and information, and is generally accredited to work experience
- Information refers to data collated for a particular purpose

2.9 Summary

This chapter reviewed the relevant literature relating to the flow of information within the organisation, which provides general theory specifically associated with BPR. The first concept discussed in this chapter is organisational structure, focusing on how the organisation has structured its activities, responsibilities, and authority. Secondly, the role of IT in enhancing organisational performance and an overview of business processes were discussed. Lastly, the role of business rules was elaborated on. Businesses process reengineering was discussed, with special focus on available techniques, including: i) process visualisation, ii) business processes modelling, iii) flowchart, iv) Petri Net, v) event-driven process chains, vi) business processes management notation. Finally, this was followed by an explanation of the ERP system and knowledge management that integrates the IT system with different sources of data that make it possible to have a fully integrated interface portal.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

The research problem was identified in Chapter One, followed by a review of the literature in Chapter Two. This chapter focuses on the appropriate research methodology for the study, which requires defending the research methods, appropriate data collection techniques, and the data analysis, thereby addressing the problem. This approach is based on information solicited from staff members involved in the process.

The theoretical background facilitates the development of the appropriate research methodology for the study as discussed in this chapter. The chosen methodology addresses the research problem by defining procedural requirements in the form of methods, philosophy, approach, strategy, data collection, and data analysis employed for the study. Finally, a case study of the residence application and admission process (“As-Is”) is presented.

3.2 Research methodology

The logical way of resolving a research problem is referred to as research methodology. The researcher undertakes research to resolve the problem in a logical manner. This section discusses the key methodologies associated with the resolution of the research problem, identifying procedure for conducting research that will result in the knowledge production (Rajasekar, Philominathan & Chinnathambi, 2006).

The research problem determines the research method applied in research; however, it can vary according to the problems to be investigated (Wedawatta, Ingirige & Amaratunga, 2011). To achieve the research aim and objectives methodologically, the researcher must select the research methodology by considering some of the following elements:

- Philosophical assumptions
- Research approach
- Research strategy
- Research design
- Data collection
- Data analysis and interpretation

Morgan (2007) argues that a research belief system informs the researcher’s interest and research methodology, which is basically the research paradigm.

3.3 Research philosophy

A research paradigm guides the actions of a researcher in terms of generating and interpreting data, which results in knowledge production (Myers, 2009). Paradigms are systems of beliefs and practices that inform the researcher's point of view regarding the phenomena that are investigated (Guba, 1990). In a research study, the nature of reality is referred to as ontology, which focuses on questions around the research assumptions in relation to the environment in which a study is conducted, taking into consideration the research view (Saunders, Lewis & Thornhill, 2009). "Episteme" is a Greek word meaning knowledge, which is the genesis for epistemology. In a research study, epistemology has the following customary questions:

- I. What is the relationship between the person with the knowhow and organisational knowledge?
- II. How does the organisation determine the organisational knowledge?
- III. How is knowledge deduced from what we know?

This philosophical approach has evolved over the years, with specific emphasis on the scientific approach of a research study (Tuli, 2010). Taking into consideration the description of ontology by Saunders et al. (2009), Krauss (2005) emphasises that ontology involves the philosophy of reality, epistemology focuses on the process of knowledge acquisition, and methodology focuses on the actual activity used to extract knowledge. Furthermore, epistemology refers to the research belief system that normally influences the choice of a preferred mechanism employed to create, comprehend, and apply the knowhow that is deemed suitable and valid (Wahyuni, 2012). The research philosophy selected by the researcher contains vital assumptions about how he/she views the world and more importantly, supports the research strategy and method (see Figure 3.1) (Saunders et al., 2009).

In-depth understanding into the management of information systems, based on the philosophical approach of human thoughts and actions in an organisational context, is informed by an interpretive research philosophy (Neuman, 2010). Notwithstanding the world's complexity, interpretivism can be reduced to quantifiable and generalised observation, which is less important when it comes to understanding the real conditions behind reality (Gray, 2004). Furthermore, interpretivism is usually the attempt to understand the subject through the eyes of people directly involved in subject processes. This understanding can be applied in same manner in an information systems context and in the process whereby the subject is influenced by the context. The interpretive discourse intends to generate a clear and integrated

illustration of what the organisation reality actually is like, despite its complexities and contradictions (Schultze & Leidner, 2002).

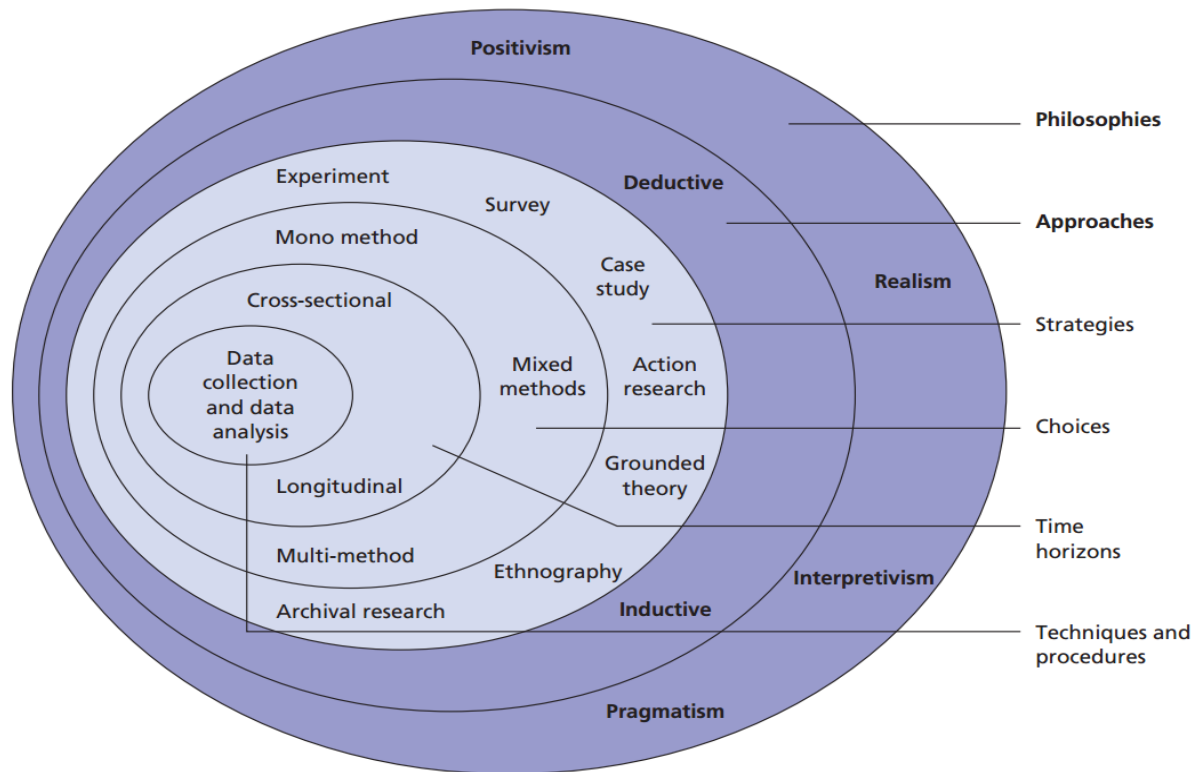


Figure 3.1: The research onion
(Source: Saunders et al., 2009:138)

3.4 Research approach

The research approach can be classified into two categories: inductive and deductive. Saunders et al. (2009) emphasises the importance of a strong theoretical grounding as the foundation for any research project, which should result in the conceptualisation of the research design. It is then important to understand the research approach selected for a research project. For example, deductive research, also known as a top-down approach, starts with theory, followed by the hypothesis, and then testing the hypothesis, while inductive research is the opposite, starting with an observation that leads to the collection and analysis of data with the aim to develop a theory. For this study, the inductive approach suits the research strategy, which is discussed in the next section.

3.5 Research strategy

Trauth (2001) suggests that a research methodology is informed by the nature of the research problem. This means the nature of questions such as *what*, *why*, and *how* inform the research strategy. The survey strategy is based on *what* and *why*

questions, while the case study strategy is used in explanatory and exploratory research. This study seeks to generate answers from *what* and *how* questions, resulting in the interpretive research philosophy. Rowlands (2005) argues that the case study strategy should be used to explore the integration of business processes and information systems; hence, the first step in this study is to form a clear understanding of the business process theory and the current application and admission process at the selected university. As indicated earlier, qualitative research methods are designed for researchers to understand their subject from their social contexts in which they live. The following are the types of methods available, but not limited to:

- Ethnography
- Action research
- Case study research
- Interpretive studies
- Examining documents and texts (Palvia, Mao, Salam & Soliman, 2003)

The selection of a case study as research strategy is therefore suitable for a qualitative research study, which will be based on the comprehensive knowledge of university processes that are essential to a general understanding of these processes.

3.5.1 Case study

The case study strategy has been employed for this study, with data collected from interviews with relevant stakeholders and analysed using acceptable data analysis techniques. The case study focuses on the examination of data collected from the existing “As-Is” RAAP (Zainal, 2007). Saunders et al. (2009) argue that for the collected data to be useful, it needs to be analysable, and the results need to be understood in the context of the study. Rowley (2002) advises researchers intending to engage in case study research to be cautious of the following challenges: firstly, the researcher has to be able to contextualise the study correctly; secondly, the researcher must be able to provide a descriptive account of “what happens” within the investigation, which must be in the form of knowledge.

This argument is supported by Yin (2003) in his presentation of the three types of case studies that can be studied. Firstly, the selected case study explores any phenomenon in the field of study, which serves to highlight the researcher’s interest – it does not start with providing possible suggestions or outcomes of the study. An analytical strategy is employed to extract adequate information or data from the case study, which is then organised to develop themes aimed at providing an

appropriate narrative for study (Rowley, 2002). Secondly, explanatory case studies are based on the need to respond to questions that require an explanation in real-life interventions, which are too complicated for the use of surveys (Yin, 2003). Thirdly, descriptive case studies “set to describe the natural phenomena which occur within the data in question, for instance, what different strategies are used by a reader, and how does the reader use them. The goal set by the researcher is to describe the data as they occur” (Zainal, 2007:3).

There are a number of techniques or procedures available to analyse data. For the purpose of this study, the collected data will be grouped by summarising the collected data and then interpreting the data (those that seem to have a dual meaning) using a grouping method by structuring the collected data according to narratives and by examining the empirical findings against the literature (Kotlarsky & Oshri, 2005). In conclusion, data analysis consists of drawing interpretations from raw data, which can be in the form of a document, observations, and questionnaires that are applied sequentially, resulting in a multi-method application called methodological triangulation (Patton, 2002).

3.6 Data collection

There are a number of data collection techniques available, which may be used as a combination or separately depending on research question(s) and objective(s). Data are collected in the form of primary data using interviews, observations, and documentary analysis as tools to respond to the problem statement. This is followed by secondary data, usually involving data collected by other types of research and that normally involves books and archival material collected for another purpose (Saunders et al., 2009).

As suggested by Parker (2003), qualitative researchers should primarily focus on soliciting data from practitioners in the organisation who are at the coalface of organisational processes and who have the ability to explain existing organisational processes clearly. Jick (1979, cited in Flynn, Sakakibara, Schroeder, Bates & Flynn, 1990) suggests that the use of multiple data sources, which could include primary and secondary data, are useful in case study research and allow the researcher to collect the data for the study.

The data collection instruments selected to gather accurate information on the existing application and admission process are interviews conducted with the following stakeholders: Application Office, Faculty Office, residence staff inclusive of residence coordinators, and student leaders.

A detailed interview guide has been adopted for conducting interviews in order to solicit a clear description of the existing business processes, to envisage or reengineer the business processes (Silvestro & Westley, 2002), and to identify the challenges experienced by individuals who have actually been involved in, and who are managing, the ERP change process (Skok & Legge, 2002).

3.6.1 Interviews

Interviews are the main source of data collection for this study. According to Qu and Dumay (2011), “one of the most important qualitative data collection methods, has been widely used in conducting field studies and ethnographic research. Even when it is not the primary method of data collection in a quantitative study, the interview method is employed often as a pilot study to gather preliminary data before a survey is designed”. Collecting data requires various skills and a clear plan of how the interviews will be conducted. The interview design process is important; it involves the identification of appropriate questions for the interviews, the number of participants, how the data will be recorded, and finally, how the data will be analysed (Doyle, 2004).

The interview questions were developed to enable the researcher to gain a broad understanding of the selected tertiary institution and the role players in the application and admission process. Participants interviewed were from the Application Office, the Faculty Office, and the Residence Office, with varying knowledge of the application and admission process. The application and admission process cuts across these three departments. The interview guidelines are presented in Table 3.1. Due to the nature of the interviews, the interview questions were similar for all participants.

3.6.1.1 Interview questions for administrators

In Table 3.1, the research problem, research questions, and research sub-questions are re-introduced, and the interview questions posed to the administrators of RAAP are indicated. Due to flexibility in the development of the interview questions, the researcher could adopt Mwishwa’s (2014) model on process analysis in order to understand the weaknesses of the business process. The interview participants provided data based on their roles in the university or informed by their experience in their respective departments. As a result, they provided different amounts of data in the form of narratives.

Table 3.1: The research problem, research questions, and interview questions

Research Problem		
<p>The information flow during the application and admission of students for residency at universities involves business processes that are inefficient and ineffective. This results firstly in mistakes being made by administrators, and secondly in dissatisfied students. Very little attention has been given to BPR in the context of tertiary institutions in South Africa.</p>		
Research questions	Sub-research questions	Interview questions
<p>RQ1: What approaches can be used to improve the application and admission process of the role players at the selected tertiary institution?</p>	<p>SRQ 1.1: What are the users' experiences during the application and admission process at the selected tertiary institution?</p> <p>SRQ 1.2: What techniques can be deployed to improve the residence application and admission process at the selected tertiary institution?</p>	<p>What is your role in application and admission process?</p> <p>What are the major activities in the application and admission process?</p> <p>What are the independent or dependent activities?</p> <p>How do you know when part of the process is done?</p> <p>Is there a rule document that governs each activity or process?</p> <p>Are you able to track the status of the application?</p> <p>Where in process do you think activities are repeated?</p> <p>What techniques do you have that support the application and admission process?</p> <p>Can you comfortably say all staff members clearly understand their role as per the workflow?</p> <p>What form of support does your office give to staff members who do not clearly understand their role in the business process?</p> <p>How will this approach improve the process?</p> <p>How are the suggestions regarding business process improvements managed in your department?</p>
Research questions	Sub-research questions	Interview questions
<p>RQ2: How does the application and admission process affect service delivery to the role players at the selected tertiary institution?</p>	<p>SRQ 2.1: How does information flow during the application and admission process at the selected tertiary institution?</p> <p>SRQ 2.2: How does information technology support the residence application and registration business processes at the selected tertiary institution?</p>	<p>What are the strengths and weaknesses of the current application and admission process?</p> <p>What parts of activities will you be prepared to eliminate in the process and why?</p> <p>Will there be some kind of application and admission process reengineering?</p> <p>What will be the role of IT in the proposed application and admission process?</p> <p>What do you want the ERP system to achieve?</p>

The next sub-section provides the specific interview questions designed for student leaders to solicit information on student dissatisfaction with RAAP.

3.6.1.2 Interview questions for student leaders

Given the focus of the study, the following aspects of the case study design require a data production method to assess the validity of the claims made in the problem statement, namely: “this results firstly in mistakes being made by administrators, and secondly in dissatisfied students”. The intent of the interview questions below is to confirm or refute the statement:

- I. How did you submit your application form?
- II. Did the university acknowledge receipt of your application?
- III. When did you receive a response from the university regarding your academic application?
- IV. When did you receive a response from the university regarding your residence application?
- V. In terms of your role as student leaders, what general queries have you received pertaining to the application and admission?

3.7 Data analysis

Data collection is followed by appraisal in a qualitative inquiry. An appraisal is commonly applied by researchers. However, there is a lack of comprehending the available techniques to analyse data (Thomas, 2006). Qualitative research data analysis can be categorised in to the two main research analysis approaches, namely a deductive and an inductive approach. With a deductive approach, the focus is on probing research questions to a group of participants. The data sources from these interviews are then analysed by means of identifying similarities and defences. Usually, the researchers depend on their experience of the setting in order to make sense of the data provided (Vosloo, 2014). An inductive approach focuses on providing a structure in the analysis of the data collected from an unstructured interview, and is based on how the researcher conducts the interviews – spontaneous and not scripted (Jebreen, 2012). It is therefore important to use one of the following data analysis techniques to develop themes from data sourced from the interviews:

- Content analysis
- Narrative analysis
- Discourse analysis
- Framework analysis
- Grounded theory

The selection of an appropriate technique is informed by research preference as well as the methodological framework chosen for the study (Vaismoradi, Turunen & Bondas, 2013).

3.8 Ethics

The ethical norms adopted for this study were discussed in section 1.7, and the letter of consent authorising the research can be found in Appendix D. Ethical consideration involves the process of disclosing the purpose of the study as well as how confidentiality will be managed. Data integrity requires stringent management of the quality of data to mitigate misrepresenting data that could lead to an ambiguous result. It is therefore essential to report research results accurately and honestly.

3.9 Summary

This chapter commenced with the identification of the research design, which is intended to identify a suitable method to apply in addressing the research question(s). The case study strategy was chosen for this study because of its applicability to real-life situations, its ability to provide better insights into the phenomenon being studied, its ability to be generalised. The research paradigm chosen is inductive rather than deductive, while the research strategy is qualitative because of its ability to study relationships between variables of the study. The data were collected by means of a literature review, interviews, and observations. Finally, the collected data in the form of narratives were analysed using content analysis.

CHAPTER FOUR: RESEARCH RESULTS AND ANALYSIS

4.1 Introduction

Chapter Three presented the principles adopted for this research study in the form of a research methodology, research method, data collection, and analysis. In this chapter, the results are presented and analysed. These results are sourced from the data collected in the case study. The data were obtained through interview questionnaires using qualitative methods.

This case study is designed to describe the residence application and admission process (RAAP), using a descriptive method to collect the data from the participants (Ps). Data collection and analysis provide the researcher with a clear understanding of the case study environment. Thus, the evaluation of the extent to which the study is able to answer the research problem and research questions is done through reintroducing the research problem and research questions.

The research problem states that the information flow during the application and admission of students for residency at the selected university involves business processes that are inefficient and ineffective. This results firstly in mistakes being made by administrators, and secondly in dissatisfied students. Very little attention has been given to BPR in the context of tertiary institutions in South Africa.

The case study research strategy has been adopted in an attempt to explore this phenomenon. This chapter presents the results of the case study, which yields a substantial amount of data collected from:

- Interviews with university administrators
- Interviews with the student leaders (SRC)

4.2 Interviews with university administrators

Data were collected from interviews conducted with the university administrators (Table 4.1) who are responsible for RAAP. Four participants (Ps) were interviewed from the Residence Office, two from the Application Office, and four from the Faculty Office. The data emanating from the interviews were studied and analysed in order to present the findings.

The findings are the result of interviews conducted with participants and informed by the participants' experiences. The development of themes from the findings begins to answer the research problem and research question(s), as once again presented in Table 4.3. This chapter presents the results of the case of RAAP ("As-Is") and

provides an aerial view of the current problems in relation to the efficiency of the process. It also provides a view of department silos with regard to the interdepartmental communication and decision making process.

Table 4.1: University administrative interview participants

	Interview Participants	Department	Responsibility
1	Participant 1 (P1)	Application Office	The function of the Application Office is to coordinate all aspects of student administration, which includes application and admission.
2	Participant 5 (P5)		
3	Participant 3 (P3)	Residence Office	This office is responsible for managing the administration of residence application and admission, the implementation of student life programs, and housekeeping.
4	Participant 6 (P6)		
5	Participant 7 (P7)		
6	Participant 10 (P10)		
7	Participant 2 (P2)	Faculty Office	This office is responsible for academic selection and admission for full-time and part-time studies.
8	Participant 4 (P4)		
9	Participant 8 (P8)		
10	Participant 9 (P9)		

4.3 Interviews with the student leaders

The interviews were conducted to test the students' perception of RAAP, as per the last part of the research problem, which states: "This results firstly in mistakes being made by administrators, and secondly in dissatisfied students". Understanding the number of students involved in the process, the researcher decided to interview student leaders involved in residences. Student leaders are the formal representation of students as per the university status and SRC constitution. They are selected because they are better positioned to provide comprehensive views to student issues with RAAP. The student leaders' responsibilities include:

- Attending to all student grievances pertaining to residences
- Engaging with university management on student issues
- Providing feedback to students pertaining to the issues raised

Table 4.2 shows the student leaders who were selected to participate in the interviews of the study, with the view that their responses either validate or refute the problem statement in terms of asserting that the current RAAP "results firstly in mistakes being made by administrators, and secondly in dissatisfied students".

Table 4.2: Interviewed student leaders

	Interview Participants	Campus	Responsibility
1	Participant 11 (P11)	Cape Town	To the university management regarding all student issues that are associated with the residences.
2	Participant 12 (P12)	Bellville	
3	Participant 13 (P13)	Nico Malan	
4	Participant 14 (P14)	Mowbray	
5	Participant 15 (P15)	Wellington	

4.4 The case

The case study is about a University of Technology in South Africa, established on 1 January 2005 as part of the South African government to restructure the size and shape of the South African higher education sector. The university has 33 000 students, several campuses and service points. The university has about 7000 students in their residences. The university management structure is divided into two sections, namely Executive Management and Governance. Executive Management is responsible for the daily operations of the university, which include preparing the budget, the human resources plan, and the academic program, while the Council is responsible for policy direction and adherence, which includes approval of the budget and the strategic plan of the university. It is important to note the role of the students in the governance of the university. Students have representation in all university governance structures. Figure 4.1 represents the general management structure of the university.

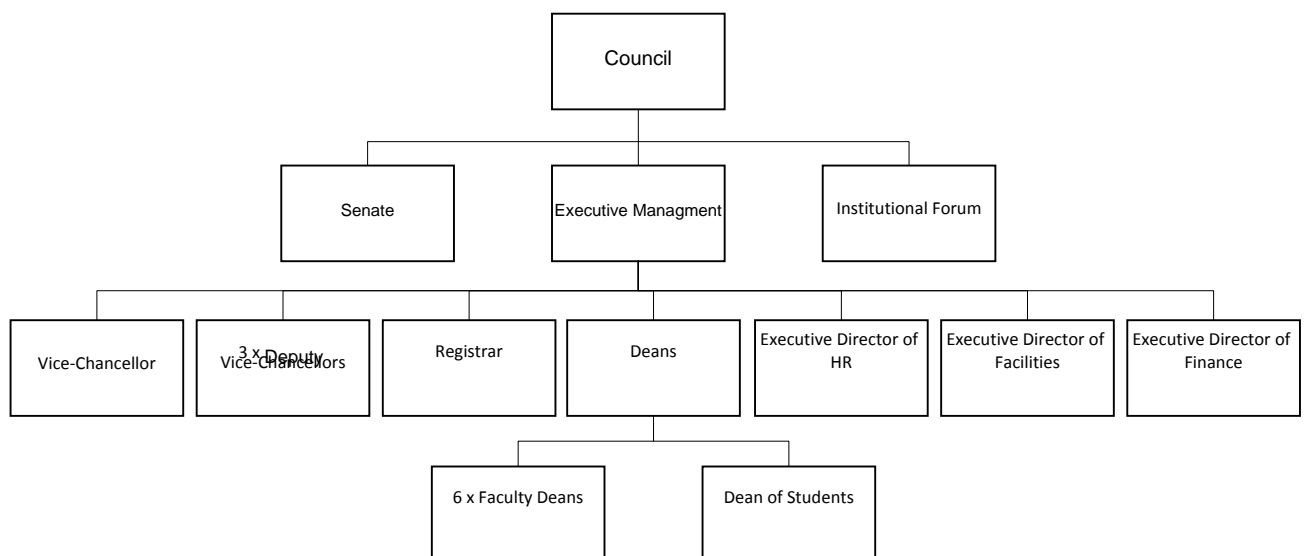


Figure 4.1: University structure

Governance

Council: The Council of the university is responsible for governance and oversight, which include the approval of university rules and all admission policies as well as ensuring the financial sustainability of the university. The university Council consist of the following members: i) three members of Executive Management; ii) five ministerial appointees; iii) three members of Senate; iv) two members of the Student Representative Council; v) one city appointee; vi) one provincial government appointee; vii) two administrative staff members; viii) two academic staff members; ix) one donor representative; ix) two Convocation representatives.

Senate: Senate is responsible for regulating academic functions such as teaching and learning as well as research. It consists of the following members: i) Executive Management; ii) heads of academic departments; ii) professors and associate professors; iv) two academic staff members; v) two non-academic members; vi) two members of the Student Representative Council; vii) two Council members; and vii) chairperson of the Institutional Forum.

Institutional Forum: Its main function is to advise Council on a range of issues affecting the institution, including national policy application, employment and equity targets, appointment of senior managers, and HR policies. The forum is made up of: i) two members of Executive Management; ii) two staff members from recognised unions; iii) two members of the Student Representative Council; iv) two Council members; v) two members of the Senate; vi) one Convocation member; vii) one member of Student Services; viii) two academic staff members; ix) two non-academic members.

Executive Management: The Executive Management of the university is responsible for the development of academic projects, which includes teaching, learning, research, and university operations. They further delegate their operational responsibilities to their directors or heads of department, who in turn ensure the daily management of faculties, departments, and units. The administrative function of RAAP resides in the Application Office, Faculty Office, and Residence Office.

Administrative function: The administrative function of the university is based on how the institution organises its functions to implement its academic calendar, The academic calendar is scheduled around the academic year, which is divided into two semesters. The second semester is the period when applications are processed, meaning the selection should be completed; thus, RAAP is a repetitive process carried out annually. It is important to note that the academic cycle requires

administrative support. This study shares with the reader some basic university administrative functions:

- **Academic administration:** focuses on managing the academic calendar (teaching and learning, research and innovation, library services)
- **Student support:** focuses on basic support for students, which involves student counselling, student housing, financial aid, student development, and student health
- **Operational:** focuses on finances, human resources and facilities

The university is required to function optimally in order to provide efficient service to its students. If any of these functional areas is not managed properly, it could result in the collapse of the administrative function of the university. There is thus a need to have an integrated system for the provision of quality teaching and excellent support services.

RAAP identifies non-value adding activities in the management of student application and admission and assists staff with managing various activities related to student application and admission, including residence application, selection, payments, and room allocation. RAAP is made possible by the current IT system (ERP system) that is used for processing academic and residency student applications. The focus of this study is on RAAP, which cannot be studied in isolation from the academic application and admission process. Academic departments' processes and decisions influence RAAP, and their roles are articulated in Table 4.1. Thus, the aim of the study is to explore how the students and the administrators involved in RAAP perceive the efficiency of university business processes and how these processes can be reengineered to fulfil the requirements of the students and administrators.

4.5 Interviews

In this study, interviews were conducted to gain relevant information from the participants involved in RAAP. The participants provided answers based on their roles in the university or informed by their experience in their respective departments. As a result, the participants provided different types of data in the form of narratives. All interviews have been recorded and transcribed. The transcriptions were then given to the participants to verify and validate the correctness.

The data collected represent the university activities and the roles of participants in RAAP in order to visualise and understand all the processes necessary for the application and admission process.

4.5.1 Research Question 1

RQ1: What approaches can be used to improve the application and admission process of the role players at the selected tertiary institution?

4.5.1.1 Sub-research question 1.1

SRQ 1.1: What are the users' experiences during the application and admission process at the selected tertiary institution?

According to P1 and P5, they are responsible for receiving and checking the correctness of application forms, while P1, P3, P6, and P10 are tasked with capturing the biographic information. P1 and P5 also capture the preferred courses chosen by students on the system and then send the forms to the respective academic departments and the Residence Office. P2 and P4 indicated that they are responsible for distributing the academic application forms received from the Application Office to the different academic departments within the faculties. The individual academic departments select the prospective students and then inform the Faculty Office of their selections. Once this is done, the faculty returns the application forms to the Application Office.

P5 further stated that, "the issuing and receiving application forms, followed by capturing personal information on the system, and preferred academic courses, sending application forms to the respective departments. Receiving academic status from the faculty and sending response letter to applicants" (Appendix B, IQ2). P3, P6, and P10 stated that they are responsible for receiving and processing the residence application forms. Processing includes capturing the biographical information and residence of their choice into the IT system. The Residence Office then awaits the outcome of the academic student applications from the Faculty Office. Once the academic outcomes have been received by the Residence Office, the specific outcome per student is uploaded and a response letter is generated and mailed to the applicant. P6 also stated that the identification of available beds or spaces in the residence forms part of residence administrator's function.

The roles and activities of the Application Office, Residence Office, and Academic office, as indicated in Table 4.3, were identified based on the responses from the participants obtained during the interviews.

Table 4.3: Faculty Office, Residence Office, and Application Office’s application activities

Application Office	Faculty Office	Residence Office
Receiving application forms	Sending application forms to respective academic departments	Identification of available beds or spaces
Correctness of application	Instituting selection committees	Uploading residence application forms
Uploading of applications	Admission or rejection of applicants	Running the academic status report
Distribution of applications	Sending the application status to the Application Office	Admission or rejection of applicants
Loading of the academic status	No activities	Sending response letter to applicants
Generating response letters	No activities	No activities

The participants were asked to identify the dependent and independent activities of the application and admission process (see Table 4.4). The success of the university’s functional areas, i.e. the Application Office, Faculty Office, and Residence Office, depends on well-defined cross-departmental processes, requiring synergy across all offices. P1 and P5 stated that the receipt and acceptance of their application forms depend on the correctness of the forms. Incorrect or incomplete application forms are not captured on the system; it is returned to the applicants. Forms that are completed correctly are uploaded on the IT system. Uploading means to capture the biographic information and preferred field of study. The participants mentioned that only uploaded forms are distributed to faculty and residence offices. P2, P4, P8, and P9 indicated that the processing of application forms is preceded by the Faculty Office receiving the application forms from the Application Office, while the establishment of the selection committee must be finished before selection is done. The dependency relationship is a finish-to-start process (finish - Faculty Office receives completed and correct application forms; start - selection committee admits or reject applicants). P4 mentioned that the “academic selection committee decision on applicant status will be processed by Application Office, only after the faculty has develop lists of applicants and the outcome of the committee” (Appendix B, IQ3).

The academic selection committee uses the application forms as well as the supporting documents and admission requirements to select applicants. According to P8, the selection committee records its decision on a spreadsheet consisting of the outcomes, which, together with the academic application forms, are sent to the Application Office. Participants in the Residence Office stated that they have to identify available beds available for allocating applicants, which is followed by the

capturing of the residence application forms on the system to avoid the over-subscription of applicants. P7 indicated that the final selection of residence students depends on the availability of their academic status. It is important to note that the core activities of RAAP have both dependent and independent characteristics. Their interdependencies are represented in Table 4.3.

Table 4.4: Dependency of application and admission activities

Application and Admission Process Activities	
Independent	Dependent
Receiving and acceptance of application forms	Correctness of applications
Uploading of academic application forms	Correctness of applications
Loading residence application forms	Identification of available beds or spaces
Faculty distribution of application forms to different academic departments	Application Office distribution of applications to Faculty Office and Residence Office
Admission or rejection of applicants	Instituting selection committees
Loading the academic status	Sending the application status to Application Office
Sending response letter to applicants	Running the academic status report

Regarding the participants' responses to the application and admission activities, P1 stated, "manager signing off forms to send to the faculties and Residence Office" (Appendix B, IQ4). P5 said that, "departmentally when we are sending off application forms, we use a checklist to ensure all supporting documents are submitted and forms are correctly captured" (Appendix B, IQ4). P5 further mentioned that, "I am doing various activities – responsible for receiving and issuing of application forms; I then check the correctness of the forms received and supporting document are attached" (Appendix B, IQ1). P2 and P4 indicated that everything that has to do with selection is based on the minimum requirements, which are found in the faculty handbook. P3, P6, and P10 mentioned that the selection process is based on the residence application and admission policy. The participants emphasised the need to link all activities across all relevant offices. After execution of one activity by a particular office, the next activity commences, which could be in the same office or in another office.

P1 and P6 mentioned that when the information on the application forms has been captured, they send the forms to the relevant faculties and Residence Office. According to P2, after receiving the status of the academic applications from the faculties, they send the list of provisionally accepted and rejected students as well as the signed, stamped application forms marked for a certain status, to the

Application Office. P3 and P5 indicated that after receiving the academic status, the Residence Office then sends out provisional residence acceptance or rejection letters. P3 and P5 further indicated that they also capture the personal information of the applicants, which has already been captured by Application Office. This means the two offices are duplicating their activities. P4 confirmed this duplication of information: "... once we receive the application forms on the spreadsheet, which is something similar to what the Admission Office does on ITS" (Appendix B, IQ6).

According to P3, staff in the Residence Office are not able to track the status of the applications. Despite the fact that there is no tracking done, the faculties need to meet stringent timelines. P2 and P4 stated that after receiving the application forms and distributing it to different departments, faculty staff members are not able to determine where the forms are and whether it has been processed or not. P10 said that, "we need application form tracking systems, which will provide an automated way for applicants to track the status of their applications and for administrators to manage the applications and admissions" (Appendix B, IQ7). The faculty staff members further mentioned that their responses are based on the information available for the scheduled meeting dates of the selection committee and on keeping record of the meetings. P3 and P7 stated that at no stage is it possible to check the status of the academic application form; they are only privy to information after the Application Office has captured the forms onto IT system. The participants' responses assisted in identifying the following findings:

Finding 1: All 10 participants expressed insight into their roles and knowledge of the application and admission process based on their departmental/office perspective

Finding 2: All participants have a clear understanding of their departmental processes and activities involved in the application and admission process

Finding 3: There are no standard operating procedures for the process

Finding 4: The institution's application system is decentralised and the forms are managed manually

Finding 5: The decentralised application and admission process is not supported by an information system, and as a result, applicants cannot track the application

Finding 6: Different terms and concepts are used as interchangeable terms to the referred process or activity

Finding 7: The IT system does not use admission requirements imbedded in the system to advise the applicant on his/her eligibility

According to P1 and P3, all staff members are trained on a regular basis on the application process, which includes capturing the application and admission forms as well as checking the correctness of the forms and where the forms must be sent for further processing, for example, to the academic departments and Residence Office. According to P2, P3, P4, P5, and P6, the Application Office organises workshops on an annual basis, focusing on the application and admission process in general. P5 and P7 indicated that they also organise departmental workshops intended to review their placement policy.

Finding 8: There are conflicting views on the nature of training provided for the proper execution of the application and admission process

Finding 9: Informal training sessions such as meetings and workshops create knowledge gaps within the departments or offices

Finding 10: There is no standardised training program focusing on the application and admission process for the relevant departments

4.5.1.2 Sub-research question 1.2

SRQ 1.2: What techniques can be deployed to improve the residence application and admission process at the selected tertiary institution?

P1 and P5 mentioned that the university uses an IT system; however, it does not have the functionality that enables applicants to process their applications electronically. This results in application forms being submitted via postal services or hand delivered, and university administrators then loading the applications on the ERP system. P3 and P10 expressed their concern regarding the non-optimisation of the IT system resulting in delays with processing forms and making decisions on selecting students. P3 said that, “we have a checklist linked to the workflow. However, it does not assist us with the forms that are received late from the Application Office or that are mistakenly sent to the academic department, which results in delays with capturing” (Appendix B, IQ8). P5 stated that the Residence Office does not always receive all the application forms; some of the forms are misplaced between departments, creating problems for applicants, hence the need

for the integration of workflow and an ERP system. The current ERP system needs to be improved to accommodate electronic applications. According to P3, “the ERP system needs to function better, which ensures the total eradication of manual forms transported between the departments” (Appendix B, IQ9). However, the participants still accept manual forms used by some students. Similarly, the selection is based on a manual process.

P1, P2, P4, P5, and P6 confirmed that they do have a workflow mapping representation of departmental business processes, while P3 stated that a checklist is used. P5 indicated that they review their business processes on an annual basis. According to P8 and P10, workshops are organised annually, where they discuss their processes (weaknesses and strengths) and formulate the new workflow process. P5 and P6 indicated that they are part of an admission committee that reviews the application process on annual basis and outlines the application and registration process. P6 emphasised the role of stakeholders in the process, which is to provide input during the meeting as agreed upon in their respective workshops. P1 and P6 stated that all staff members are trained on a regular basis on the application process, which includes capturing application and admission forms and checking the correctness of the forms as well as where the forms must be sent for further processing. However, there is complacency creeping in because of repetitive processes. P5 shares P1 and P6’s view emphasised the importance of the workshops and meetings used for training. P7 stated that they are part of the process design.

Discussions on improving the process take place within the confines of the respective departments or offices. This view is also shared by P2, P6, and P9, who indicated that they discuss the application and admission process in their departments as and when needed. P9 further indicated that, “when there is need to provide technical support to application and admission processes, the office will then engage the IT department to advise them on IT requirement for their plans” (Appendix B, IQ12). The institution has a central committee, chaired by the Registrar, which deals with application, admission, and registration issues. All participants indicated that they participate in the institutional admissions committee, which reviews the application process on regular basis. At this meeting, they always submit their departmental input on the process.

Finding 11: There is no integrated IT system to facilitate the processing of application forms across multiple departments

Finding 12: The lack of an integrated information system results in a poor data management system, which is required for decision making

Finding 13: The current operating system is not optimised to enable the effective coordination of the tasks of relevant departments with regard to the residence application and admission of students

Finding 14: Most of the errors identified by the administrators are attributed to the nonexistence of an automated system

Finding 15: A manual application and admission process may lead to a delay in decision making

Finding 16: The application and admission process has inherent weaknesses

4.5.2 Research question 2

RQ2: How does the application and admission process affect service delivery to the role players at the selected tertiary institution?

4.5.2.1 Sub-research question 2.1

SRQ 2.1: How does information flow during the application and admission process at the selected tertiary institution?

P1 and P6 states that the university has dual processes that accommodate applicants from different social backgrounds, and that it takes a long time for the processes to be concluded. P2 argued that the “manual application process does not affect any local students but has a huge impact to all outside Cape Town applicants; forms need to be sent to them if the additional information is required; it takes too long to get feedback” (Appendix B, IQ13). For example, forms need to be sent to the applicant if additional information is required, resulting in a delayed feedback process. P3 and P5 presented a weakness of the current system. Firstly, “it is a paper-based process, which depends on another department to send the application forms to us. They sometime get lost while being transported by messengers” (Appendix B, P3, IQ3); and secondly, “the weakness is [that] manual forms [are] sent to the Faculty Office and Residence; they sometimes get lost in transit” (Appendix B, P5, IQ13).

According P1 and P6, both the Application Office and the Residence Office want to eliminate sending manual forms to faculties and residences because forms get lost between departments. P6 mentioned that, “one of the biggest challenges of manual

forms been sent to respective departments, some forms do not reach their intended destination. Capturing everything can be done at the Application Office and will reduce the risk” (Appendix B, IQ14). In all cases, no one takes the responsibility for this. P8 stated that, “the manual system does not provide a guarantee in compliance with rules and regulations, because the selection is mainly done manually and often results in errors that are being made” (Appendix B, IQ14). P2 and P4 support automation of the process and mentioned that the manual processes lead to many mistakes. All participants stated that they would prefer doing away with manual forms. They agree that the available system is not being used optimally.

Finding 17: The Application Office is the origin of information flow and errors are made here, which influence all offices responsible for the application and admission process

Finding 18: A duplication of processes or actions takes place between the Application Office and the Residence Office

Finding 19: All participants in the Residence Office and Faculty Office rely on paper-based information provided by the Application Office to execute their functions, which is prone to forms getting lost in transit

Finding 20: The information flow challenges lead to process improvement initiatives

Finding 21: There is inadequate alignment between the current business processes and the IT system

Finding 22: Cross-departmental movement of application forms is not linked to the IT system, which results in problems and inefficiencies

Finding 23: The IT system does not have an automated application and selection functionality

4.5.2.2 Sub-research question 2.2

SRQ 2.2: How does information technology support the residence application and registration business processes at the selected tertiary institution?

P3 states that the university has an information technology infrastructure and software. P6 mentioned that “We have developed a framework that needs IT to automate [the] residence application process, and provide feedback, automated

response, on the academic status, meaning that everything will be captured at the Application Office, and faculties will run report and confirm selection based on available spaces, and same will be applicable” (Appendix B, IQ16). P1 argued that it should be used to “reduce the amount of forms processed in a number of departments, which will mitigate the errors and enable the applicants or administrators to monitor and track forms. [It will] basically help with the integration of separate systems and improve usability” (Appendix B, IQ17). P2 and P4 confirmed that in the future, the university plans to automate the application and selection process, which will reduce errors as well as complaints received. According to P3 and P5, both the Application Office and the Residence Office depend on information received from other departments. This means that if decisions in other departments are captured on the system, they do not need any forms to process the applications.

Finding 24: The university uses a dual application system to accommodate applicants from different socio-economic backgrounds

Finding 25: There is a need to integrate the application and admission process with the ERP system to enable the university to automate its application system

Finding 26: The IT system is in a development phase to enable applicants to track their applications

4.6 Interviews with student leaders (SRC)

In order to determine the extent of student satisfaction with RAAP, interviews were conducted with student leaders (LHC and Welfare Office) across the five (5) campuses of CPUT. The student leaders were selected because of their involvement in the residence application and admission of students; in particular, they are the liaison between the students and university administrators. The interviews were conducted using the interview guide (Appendix A), focusing on research question 1, specifically sub-research question 1.1.

RQ1: What approaches can be used to improve the application and admission process of the role players at the selected tertiary institution?

SRQ 1.1: What are the users’ experiences during the application and admission process at the selected tertiary institution?

According to P 11, P14, and P15, their application forms were posted to them. Many students received forms at the university's open day. P12 indicated that, "I received the forms during the university open day, and submitted them personally before the closing date" (Appendix C, IQ1). Some students delivered their applications per hand. P13 indicated that his application forms were hand-delivered by his brother. Most of the participants indicated that the university has not acknowledged receipt of their application, with the exception of one participant who could not recall.

According to P 11:

"No response whatsoever, I called couple of times in November and I was told I will be informed after examinations, in December the staff did not pick-up my calls at all. Eventually in January I had to come to Cape Town to enquire about my application. Again, no one was prepared to assist me until I reported the issue to SRC. It took at least two weeks for my status to be resolved" (Appendix C, IQ3).

P12 mentioned that he received his response in the middle of December after many attempts of asking for a response from the university, resulting in frustration and despair. Similar sentiment of anxiety and unhappiness were shared by P13, P14, and P15 who received their responses late in November and early in November respectively. Linked to the aforementioned, the majority of participants expressed frustration with a process that requires applicants to make a number of phone calls in order to obtain information about the progress of their applications. P11 said that, "in November I called student housing enquiring about my application, and they told me they had received the application, however, they are not in a position to offer me residence because they are waiting for the academic selection" (Appendix C, IQ4). P12 had to travel from the Eastern Cape to obtain a response. P15 is the only exception – he received his response at the end of November.

The second issue raised by participants is the lack of integration between university departments, which is causing much unhappiness. P13 expresses dismay with the fact that housing requested him to fax the academic acceptance letter. P13 complained that he could not understand why he had to spend money to fax a letter back to university that sent him a letter in the first place, while P14 said:

"After calling the student housing I was told that I will receive my form response before the end of the year, which arrived just early in January, as a result I did not enjoy my vacation. Notwithstanding the fact that I was told I do qualify for residence by a residence official during our telephone discussions" (Appendix C, IQ4).

The residence administrative process is not designed to suit applicants. This point was argued by P11:

“The university management does not understand, or they are deliberately ignoring students’ issues with regard to the application processes. Firstly, on an annual basis the SRC raises issues encountered by students regarding the admission. We do not get suitable responses, e.g. at Wellington campus they are able respond to all their students before the end of the year, why is it not possible in Cape Town or Bellville. The issues are the same, the academic selection committee is taking their time to select students for the next academic year. The Application Office is not sending residence forms to the Residence Office, and the Residence Office is not capturing forms which were received after closing date” (Appendix C, IQ5).

P12 emphasised the non-existence of a response timeline, contrary to clear application timelines, resulting in the non-accountability of university officials. According to P13, the failure to communicate with applicants results in unplanned expenditure by students, which involves traveling and phoning. P14 said:

“We have two groups of students on our campus, Education and Management. Education students do receive their responses from the university for their academic applications. For residence, as student leaders we have to travel to Cape Town Campus to enquire about the status of our students, in most cases the Residence Office did not receive their application, which results in conflict between us and the management of Residence. Students complain about receiving their acceptance letter too late, resulting in them missing out on residence space” (Appendix C, IQ5).

Interviews with selected students have shown the following: firstly, it affirms the issues of students’ dissatisfaction with RAAP; secondly, it has produced the evidence that university processes are not integrated, and as such, some departments are able to process applications timeously while others are not (as per P14’s statement above).

Finding 27: Post and hand delivery are the most common means of submitting application forms

Finding 28: The university does not acknowledge receipt of application forms

Finding 29: Communication is at the centre of the students’ dissatisfaction

Finding 30: The flow of information between departments impedes on the university’s ability to respond speedily to applicants

Finding 31: The university's approach on RAAP is inward looking rather than outward looking

4.7 Theme development

The purpose of this section is to identify themes that are emerging from the findings. According to Saldaña (2015), the themes emanate from analytical reflection (coding and categorisation). The themes are critical for effective data management where data are sourced from multiple data sets and informed by the objective to integrate the overall data available for analysis, focusing on providing a broad narrative that will enable researchers to draw their own understanding (Coghlan & Brydon-Miller, 2014). An important aspect of ensuring the validity and reliability of results is that qualitative research requires the use of a descriptive procedure that focuses on using detailed results based on the actual narrative from the participants to describe the setting, the participants, and the themes (Mafuwane, 2012).

4.8 Summary

The empirical results obtained through analysing the interviews, guided by the methodology on collecting the research data, were presented in this chapter. The participants provided in-depth personal experience of the application and admission process, including the identification of the current RAAP, followed by the identification of bottlenecks in this process, and finally, proposing the reengineered application and admission process.

From the interviews, recurring patterns were identified, which preceded the development of common themes. The themes were sourced from the 31 findings using an inductive approach, based on the identified categories in Table 4.5. The six (6) themes are: i) business processes; ii) Information management; iii) integration; iv) business management; v) training; and vi) communication.

Table 4.5: Summary of findings, categories, and themes linked to research questions and sub-questions

Research questions	Findings linked to research questions	Categories linked to findings	Themes
University administrators			
RQ1 SRQ 1.1	<p>Finding 1: All 10 participants expressed insight into their roles and knowledge of the application and admission process based on their departmental/office perspective</p> <p>Finding 2: All participants have a clear understanding of their departmental processes and activities involved in the application and admission process</p> <p>Finding 3: There are no standard operating</p>	<ul style="list-style-type: none"> • Process • Activities • Role of offices in the process • Operation procedure • Operating system 	<ul style="list-style-type: none"> • Business processes • Information management • Integration • Business

Research questions	Findings linked to research questions	Categories linked to findings	Themes
	<p>procedures for the process</p> <p>Finding 4: The institution's application system is decentralised and the forms are managed manually</p> <p>Finding 5: The decentralised application and admission process is not supported by an information system, and as a result, applicants cannot track the application</p> <p>Finding 6: Different terms and concepts are used as interchangeable terms to the referred process or activity</p> <p>Finding 7: The IT system does not use admission requirements imbedded in the system to advise the applicant on his/her eligibility</p> <p>Finding 8: There are conflicting views on the nature of training provided for the proper execution of the application and admission process</p> <p>Finding 9: Informal training sessions such as meetings and workshops create knowledge gaps within the departments or offices</p> <p>Finding 10: There is no standardised training program focusing on the application and admission process for the relevant departments</p>	<ul style="list-style-type: none"> • Decentralised system • Loading • Inaccurate application forms • Forms lost in transit • Tracking of forms • Interchangeable terms • System requirements • Training • Knowledge gap 	<p>management</p> <ul style="list-style-type: none"> • Training
RQ1 SRQ 1.2	<p>Finding 11: There is no integrated IT system to facilitate the processing of application forms across multiple departments</p> <p>Finding 12: The lack of an integrated information system results in a poor data management system, which is required for decision making</p> <p>Finding 13: The current operating system is not optimised to enable the effective coordination of the tasks of relevant departments with regard to the residence application and admission of students</p> <p>Finding 14: Most of the errors identified by the administrators are attributed to the nonexistence of an automated system</p> <p>Finding 15: A manual application and admission process may lead to a delay in decision making</p> <p>Finding 16: The application and admission process has inherent weaknesses</p>	<ul style="list-style-type: none"> • Integration of IT system • Data management • Decision making • Operating system • Manual process • Automation • Accountability and responsiveness • Inclusivity 	
RQ2 SRQ 2.1	<p>Finding 17: The Application Office is the origin of information flow and errors are made here, which influence all offices responsible for the application and admission process</p> <p>Finding 18: A duplication of processes or actions takes place between the Application Office and the Residence Office</p> <p>Finding 19: All participants in the Residence Office and Faculty Office rely on paper-based</p>	<ul style="list-style-type: none"> • Information flow • Alignment BP and IT system • Process improvement initiatives • Paper-based 	

Research questions	Findings linked to research questions	Categories linked to findings	Themes
	<p>information provided by the Application Office to execute their functions, which is prone to forms getting lost in transit</p> <p>Finding 20: The information flow challenges lead to process improvement initiatives</p> <p>Finding 21: There is inadequate alignment between the current business processes and the IT system</p>	<p>information</p>	
<p>RQ2 SRQ 2.2</p>	<p>Finding 22: Cross-departmental movement of application forms is not linked to the IT system, which results in problems and inefficiencies</p> <p>Finding 23: The IT system does not have an automated application and selection functionality</p> <p>Finding 24: The university uses a dual application system to accommodate applicants from different socio-economic backgrounds</p> <p>Finding 25: There is a need to integrate the application and admission process with the ERP system to enable the university to automate its application system</p> <p>Finding 26: The IT system is in a development phase to enable applicants to track their applications</p>	<ul style="list-style-type: none"> • IT system • Weaknesses and Inefficiency • IT system functionality • Dual process • Integration of IT system with BP 	
Student Leaders			
<p>SRQ 1.1</p>	<p>Finding 27: Post and hand delivery are the most common means of submitting application forms</p> <p>Finding 28: The university does not acknowledge receipt of application forms</p> <p>Finding 29: Communication is at the centre of the students' dissatisfaction</p> <p>Finding 30: The flow of information between departments impedes on the university's ability to respond speedily to applicants</p> <p>Finding 31: The university's approach on RAAP is inward looking rather than outward looking</p>	<ul style="list-style-type: none"> • Different practices in the same university • Non-responsiveness • Role clarification • Timelines • Applicants are valued 	<ul style="list-style-type: none"> • Business processes • Communication

In the next chapter, the themes are discussed in relation to the research questions and the literature.

CHAPTER FIVE: DISCUSSION

5.1 Introduction

The university's current RAAP contains a number of bottlenecks and duplications that compromise the process's integrity in respect of the responsiveness to the expectations of applicants. The interviewed participants assisted with identifying these bottlenecks and duplications, which constitute part of the findings. The findings were subjected to additional scrutiny aimed at identifying broader themes emerging from the study.

In this chapter, the following themes are discussed:

- i) Business processes
- ii) Information management
- iii) Integration
- iv) Business management
- v) Training
- vi) Communication

In the next section, the themes are explained in relation to the research questions and the aim of addressing the research problem.

5.2 Theme 1: Business processes

University administrative challenges are complex and require mapping out the relationship between the activities and functions of various departments. In some cases, the processes related to the challenges can be attributed to the inadequate description of university activities. This requires a review of organisational processes and a detailed description of the participants as well as the roles they have to fulfil. The academic description of this process is called business process reengineering (BPR).

BPR is simply understood as organisational process restructuring rather than presenting an organogram (line function). The purpose of BPR is to improve the integration of all organisational activities in order to improve the productivity or service provision (Silvestro & Westley, 2002). The intent of business process mapping is to have a visual representation of organisational processes in order to identify problems and areas for improvement (Tsvetanov, 2008).

5.2.1 "As-Is"

The business processes shown in Table 4.3 represent a set of business activities relating to RAAP as performed by university departments (see Figure 5.1).

Business process modelling facilitates the use of tools that enable the organisation to document, analyse, improve, and streamline its activities. After documenting and analysing business processes, the next step is to improve and streamline the activities aimed at improving the organisation's effectiveness and efficiency. Georgakopoulos et al. (1995) maintain that business reengineering will improve business operations (optimisation of current systems), which will then lead to a quick turnaround time on services requested and improved quality of the services provided, resulting in increased customer satisfaction.

The university RAAP is a paper-based process and information system. Event-driven process chain (EPC) as modelling tool is used because of its ability to represent the activities of each department in a single model. The admission requirements are stated in university documents (admission requirements can be set as business rules in the ERP system). Business rules should be clearly defined for the optimal application of business processes. These business rules need to be articulated in the ERP system provided by the university, with an understanding that the complexity of the processes requires additional controls such as items access, uploading, and downloading. Each department has a process owner whose function it is to ensure that access to systems is managed properly, taking into consideration that RAAP is dependent on activities performed by other university departments' supported information system and ensuring that proper controls are in place for accountability. This requires improved business processes through customisation, informed by a simple, non-complex, and flexible process-based system (Gunasekaran & Nath, 1997).

5.2.1.1 “As-Is” analysis

RAAP is based on sequential activities that are executed by staff and by using information technology to respond to the needs of applicants. The main problems identified when analysing the “As-Is” model relate to the application and admission process of the university.

Below is a list of the problems that were identified:

- The current system is primarily a manually-based registration form captured by back office staff
- Manual forms are physically delivered to different departments, resulting in delays and in some cases forms are lost in transit
- Communication between various departments of the university is not system-based, meaning that after the students have been admitted, the forms are

sent back to the Application Office for the status to be captured on the system

- Once the status has been updated on the system, the Residence Office selects and admits the student into the residence
- The IT system is not fully utilised
- Admission decision making is not automated (committee work)

The identified problems above help with a clear identification of the areas for improvement, indicated in Figure 5.1, which is discussed in the next section.

Table 5.1: Eliminated activities

No.	Explanation
1	<p>The process is still paper-based; the process is meant to assist the applicants with self-print functionality of application forms. Once the applicant prints the application forms, he/she must manually submit the forms.</p> <p>Improvement: The process moves away from a paper-based system; it is fully automated. At no stage will the applicant be required to print documents; however, the applicant will be required to upload supporting documents onto the system.</p>
2	<p>The current process requires all applicants to submit application forms manually, and the university charges an administration fee (application fees).</p> <p>Improvement: The introduction of an automated system will reduce the volume of paper-based forms, which will expedite the processing of forms. Finally, lost forms between departments will be reduced.</p>
3	<p>The current ERP system functionality is not optimised; the process has duplicate activities carried out by the Faculty Office and Residence Office, which involves the capturing of biographical information of the applicants.</p> <p>Improvement: Streamline the application and admission process, which will be helpful in assisting the university in improving its response time to the applicants.</p>

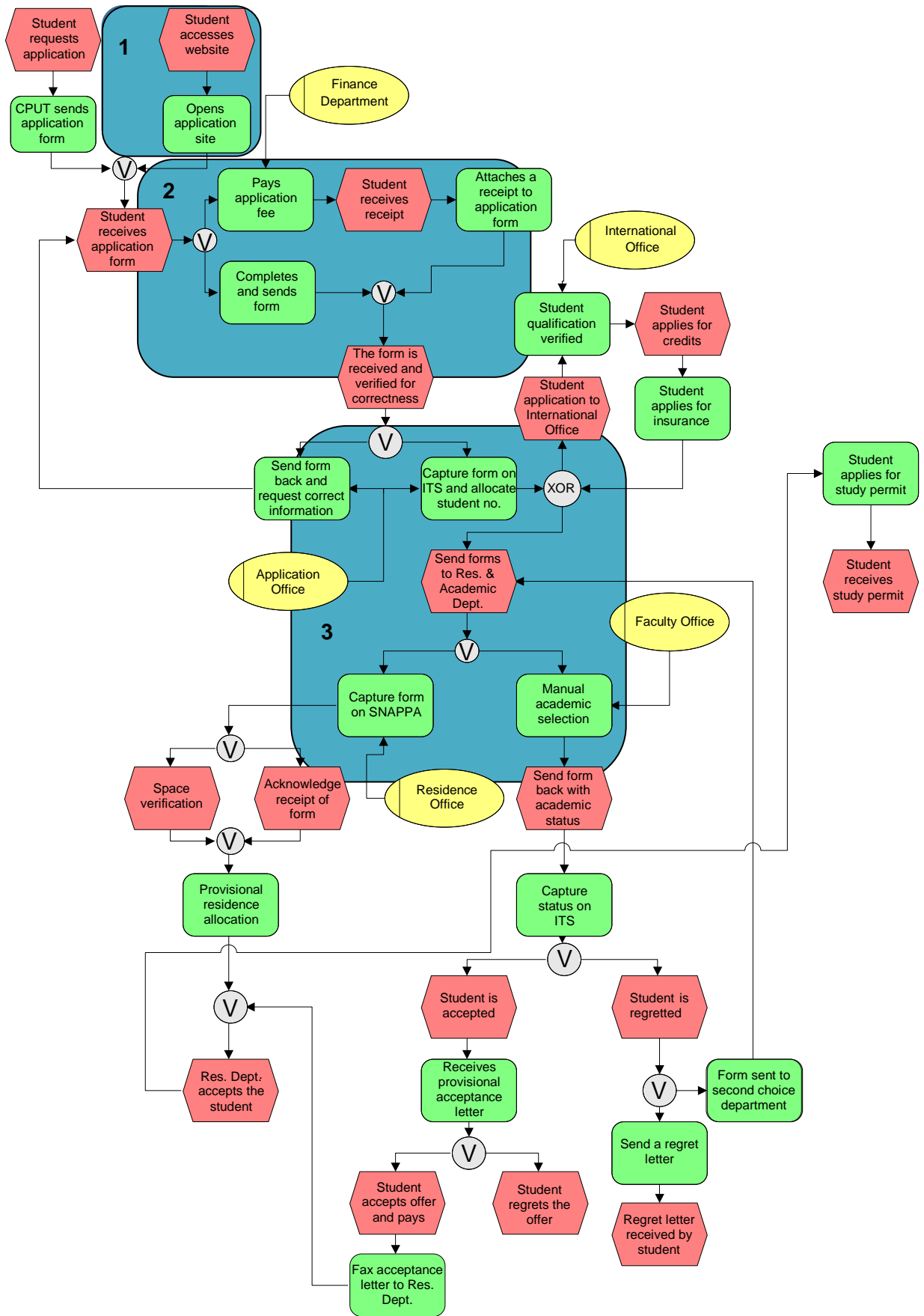


Figure 5.1: “As-Is” application and admission process (EPC)

5.2.2 “To-Be”

The context of this study is framed around the efficiency and effectiveness of the application and admission process, hence the need to reconcile applicants' expectations with university resources. These should be done taking into consideration the submissions of applicants/participants, and considering the current ERP system.

The actual process involved determines the activities and departments, and plays an essential role in RAAP, as reflected in Figure 5.1. The observations from the interviews suggest a number of redundant activities (see blue blocks 1, 2, and 3 in Figure 5.1), while activities not shaded in blue are considered as essential in the residence application and admission process.

Participants identified the following activities involved in the application and admission of residence students that need to be improved to enhance the application and admission process:

- Reduce paper-based application forms by focusing on automating the business processes
- Integrate business processes with the ERP system to enable the monitoring and tracking of applications for both the applicants and the Residence Office staff
- Eliminate gaps with the application/admission process, such as losing forms between departments
- The identification of relevant skilled and competent staff will inform the success of reengineering the residence application and admission process, which will result in improved service delivery to students
- Current job positions will have to reviewed, with the aim of redefining these positions in terms of the envisaged RAAP, followed by staff development (training)
- Informed by the aforementioned application and admission process, the modelling processes are constructed from the information presented in Table 4.1

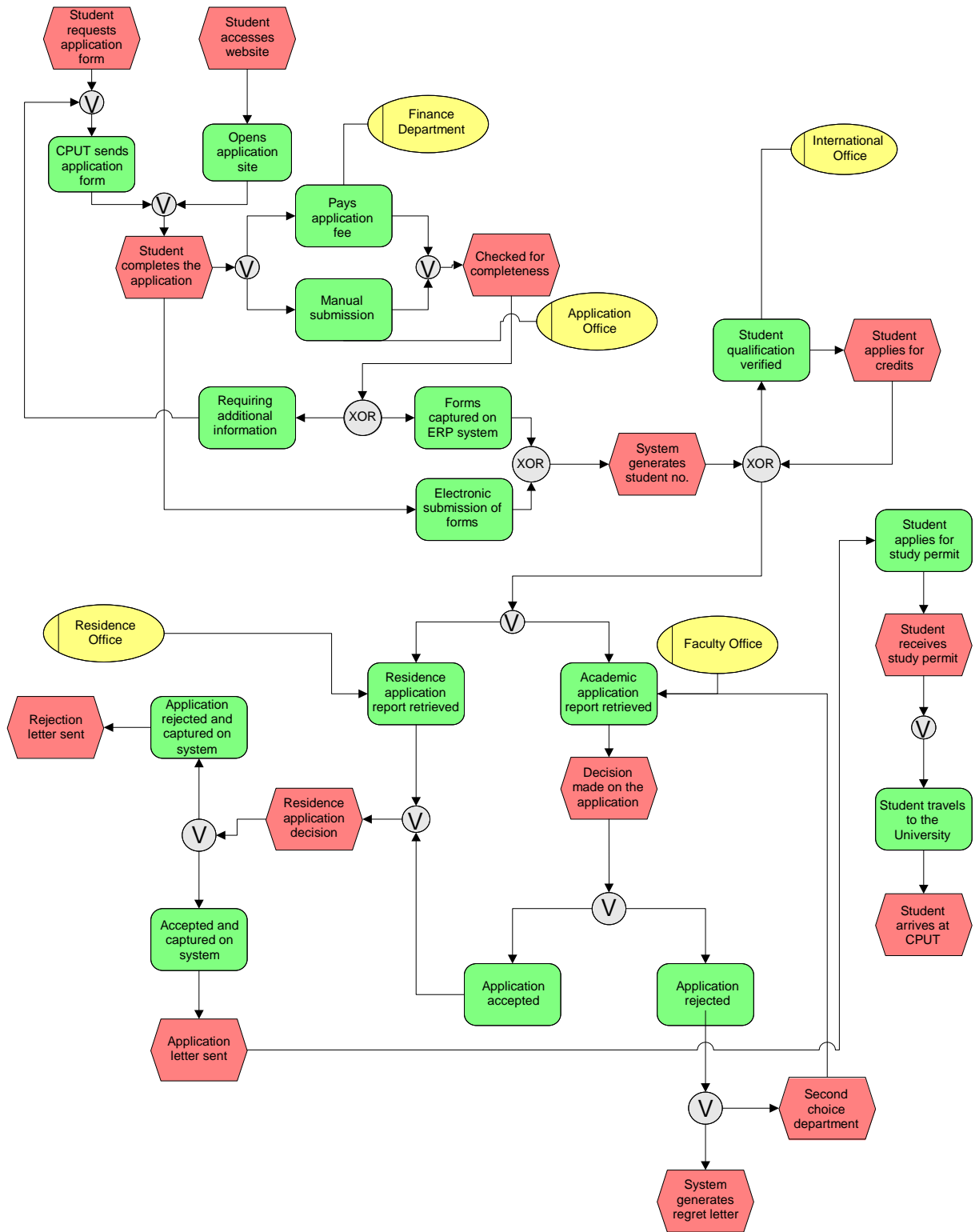


Figure 5.2: “To-Be” application and admission process (EPC)

5.3 Theme 2: Information management

Information management is an essential part of any university’s operations; in particular, the decision making process that determines the effective and efficient flow of information between university departments. The impact of effective and

efficient business processes enhances the competitive advantage of the university. This can be done by identifying information requirements for the organisation that should include, but not be limited to the uploading, storing, access, and distribution of information. Understanding the importance of the proper management of information necessitates capacity building within the organisation (Banks, Onita & Kettinger, 2013).

The participants agree on the importance of accurate information in their respective functional areas. It is also reported in the findings that individuals in their functional areas do not seem to know how other departments use the information provided and what impact it has on making informed decisions. However, participants did mention the importance of information technology in their departments. Question 8 of the interview guide posits the following question: “What techniques do you have that support the application and admission process?” P1 stated that, “we use the IT system; however, it has a limited functionality. Students are not able use it to apply. We mainly use the IT system after the application forms are received. However, we need to develop some functionalities that will allow automatic selection” (Appendix B, IQ8). In response to this question, P10 said that the limited use of the ERP system perpetuates a prolonged decision making process. Addressing the question from a pure technical point of view, question 16 of the interview guide posits the following question: “What will be the role of IT in the proposed application and admission process?” Participants’ responses were based on different vantage points; they did not have a holistic view. P1 said the following: “We have a software program that we use to load the forms; for the proposed system, the loading will be minimal, because students will capture their personal information themselves. Only a limited number of applications will be processed manually” (Appendix B, IQ16). P3 stated that, “we do have software and IT infrastructure to support [the] residence application and admission process, however, we need to develop some functionalities that will allow to do automatic selection” (Appendix B, IQ16). Finally, P5 said that, “we expect IT to be responsive to the needs of departments, which means integrating selection decisions and automation of selection, which can easily be done by integrating admission requirements” (Appendix B, IQ16). This argument is supported by Murphy and Simon (2002:305): “ERP systems are implemented to integrate transactions along and between business processes. Common business processes include order fulfilment, materials management, production planning and execution, procurement and human resources. ERP systems enable efficient and error-free workflow management and accounting processes including in-depth auditing”. The emphasis is on the integration, which is discussed in the next section.

The participants agree on the importance of accurate information in their respective functional areas. It is also reported in the findings that individuals in their functional areas do not seem to know how other departments use the information provided and what impact it has on making decisions.

5.3 Theme 3: Integration

Integration is a business process that requires the synchronisation of business process activities performed in the same department or across different departments within the organisation. The process of integrating the information system, RAAP, and the organisational structure will form the basis of “As-Is” process improvement activities, which will result in the reengineering of RAAP.

The integration of processes will be supported by ERP systems across all departments of the organisation. It will provide an integrated environment that supports organisational administration, which will result in improved customer satisfaction and productivity (Themistocleous, Irani & Love, 2004). This study therefore proposes the integration of the ERP system with the residence application and admission process, which has the potential to result in the following:

- Automation of residence application and admission data storage and processing
- Optimisation of university administrators’ work and time
- Integration of work (application and admission) done in different administrative departments of the university
- Optimisation of the current information systems infrastructure
- The ERP system will allow remote access to the university application system via the Internet for all applicants, with clear authorisation procedures for accessing and updating the system. The university administrators will be able to update the application status, run reports, and search for the academic status of students

In this approach, the integration goal can be achieved by determining the emerging scenarios presented by business processes that focus on the automation of RAAP. The next section discusses business management from a BPR point of view.

5.4 Theme 4: Business management

Business management focuses on how a university plan maintains its competitive advantage. Understandably, the university is not a business; its aim is not to maximise profit from its operations. However, there is a general expectation that the university should be sustainable. Thursby and Kemp (2002) argue that universities

are not fully exploiting their resources for economic growth and competitiveness. It is therefore important to ensure the efficient use of university resources. In the context of this study, the focus is on how the university uses its resources to achieve organisational goals. Aureli and Salvatori (2012) argue that an organisation is required to set clear goals in order to improve its business processes. This requires the organisation to identify the bottlenecks in their business processes. BPR literature provides a framework for identifying areas of improvement.

Lastly, goals are developed from the information solicited by the researcher by means of questionnaires or interviews conducted with the relevant stakeholders. The main improvement goals, which are identifiable from the interviews or questionnaires, need to have a visible impact on organisational processes. It becomes an important consideration to understand the implication of these processes on the organisation with regard to resources (HR, Finances). It has a direct impact on how the organisation manages and monitors its activities informed by staff development, which in turn influences the organisational environment. McAdam and McCormack (2001) argue that organisations can opt to change their current structure, which means a role change for employees. This can be done in line with change management principles and relevant labour relation legislation. All employees need to be informed of the implications affecting business process reengineering during and after the processes review to ensure that all the stakeholders understand the important drivers of process reengineering within the organisation, and clearly, human and financial resources are at the forefront.

5.5 Theme 5: Training

Training is critical in a changing environment. Employees are required to perform various functions in their respective organisations; in some cases, this requires up skilling, use of processes, teamwork, eliminating errors, and proposing a new process (Bordeianu & Kohl, 2015). It is important to understand that not all training programmes will result in improved organisational performance; training programmes need to be individualised and focused on specific functional area requirements to ensure the direct application of skills acquired during the training programmes (Rahman, Ng, Sambassivan & Wong, 2013).

The largest part of the participants indicated that most of the training conducted in respect of applications and admissions is in the form of workshops, as a number of staff development programmes are available at the university. More importantly, online training programmes can be developed and become permanently available on the ERP system. The workshop method is adequate when processes are

mapped and bottlenecks are identified, but workshops need to be followed up by formal training programmes to address the challenges and applications on the ERP system. Without a formal training programme, it is impossible for staff to attain the required knowledge needed to perform their functions.

In addition to the current demands for innovation, RAAP will require input from the participants, which will ensure application and admission articulation and responsiveness. This does not mean staff members will not make errors and applicants will be indefinitely satisfied with the quality of service. Errors are a result of complacency, and in order to mitigate these errors, the university is required to continuously assess its processes and ensure that staff members maintain the process requirements and knowhow.

5.6 Theme 6: Communication

Communication is a pillar of business processes. This argument is supported by McAdam and McCormack (2001) who view communication as the inherent enabler of efficient business operations, which can be attributed to the growth of communication technology over the last decade. Computer technology allows the organisation to communicate effectively within the organisation as well as with their customers or business partners. However, the matters raised by student leaders do not refer to the issues of technology; rather, it refers to basic telephone and mail communication that has not been satisfactory. According to P11:

“No response whatsoever. I called a couple of times in November and I was told I will be informed after examinations. In December, the staff did not pick-up my calls at all. Eventually in January, I had to come to Cape Town to enquire about my application. Again, no one was prepared to assist me until I reported the issue to SRC. It took at least two weeks for my status to be resolved” (Appendix C, IQ3).

According to student leaders, the nonresponsive of the university to telephonic queries creates unwarranted anxiety, which leads to dissatisfaction. They furthermore explained that departments are not communicating effectively; their argument is based on the notion that the Education faculty is able to respond to their applicants timeously, while other faculties respond late in the year or at the beginning of the new year, hence the need to apply communication technology to mitigate these issues.

5.7 Research questions revisited

The purpose of this section is to determine whether the research methodology employed has been adequate to find answers to the research questions.

RQ1: What approaches can be used to improve the application and admission process of the role players at the selected tertiary institution?

To answer this question, RAAP analysis, followed by modelling of the process and concluding with the redesign of RAAP, has been done using BPR theory concepts to frame the discussions. These concepts are also used in responding to the research problem, which is essentially about understanding how business processes affect organisational efficiency and customer satisfaction.

The participants indicated that a number of weaknesses in the application and admission process can be eliminated, hence the application of the aforementioned theory. The daily administrative processes, which are explained in the final chapter, provide an overview of the interaction between the application forms and the IT system currently in use. Furthermore, the actual analysis was preceded by modelling the application and admission process, aimed at illustrating all activities involved in RAAP. Table 5.1 illustrates three areas of improvement resulting in the reengineering of RAAP, which enables the university to align its activities, processes, and system. Finally, the response to this question (RQ1) is twofold: Firstly, the use of ECP to model the application and admission process made it easy to identify and eliminate activities and processes that are not adding value to the business processes, as expressed in the beginning of this section. Secondly, the optimisation of current information technology aims at streamlining the activities of the Application Office, the Faculty Office, and the Residence Office. The ERP system should be used to resolve current process problems; if the IT system of the university does not have the capabilities to resolve the identified problems, new system development should be considered.

RQ2: How does the application and admission process affect service delivery to the role players at the selected tertiary institution?

The Cambridge Dictionary describes service delivery as “the act of providing a service to customers”. The issue of the university’s response turnaround time to applicants is critical. RAAP depends on the decision (accept or reject) of academic departments in order for the Residence Office to finally take a decision in admitting a student in residence. Thus, the manner in which decisions are communicated between the departments is of the utmost importance, which means correct and accurate information must reach the Residence Office to execute its function.

The decision making process should consider organisational processes as well as how knowledge is applied and shared within the organisation. This argument is supported by Ashogbon (2012:9): “A business process consists of two or more dependent or standalone business activities that must be completed and are sequentially interconnected and having an input/start and an output/end, which adds value”. The nonexistence of a tracking system makes it impossible for decision makers situated in different departments to coordinate their activities properly, thereby making the selection process tedious for applicants. Figure 5.3 shows the impact of decisions made in the academic departments.

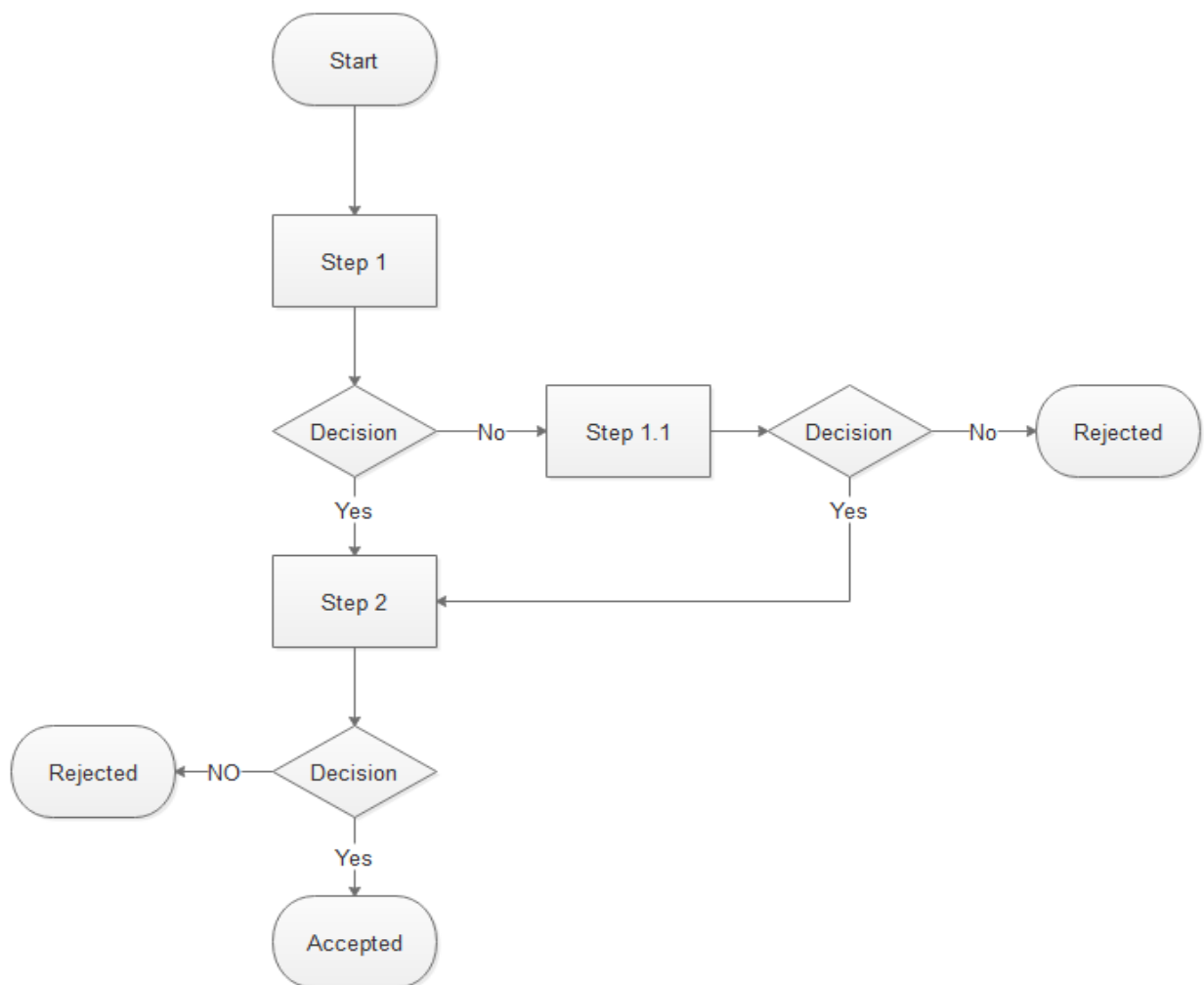


Figure 5.3: Decision making process

The academic application form provides applicants with qualification choices in terms of first choice and second choice to consider.

Step 1: The academic department selection committee decides on whether to accept or reject the student; if “No”, the application is diverted to the second choice, represented in Step 1.1. If the application is successful, the next step in the decision

making process commences, and if not, the process ends with the rejection of the applicant.

Step 2: Only after provisional academic acceptance will the Residence Office be able to make its decision of whether to accept or reject the applicant. Whatever the outcome of the decision, the process ends here.

All participants expressed dissatisfaction with the current process, as it is too drawn out; decision making regarding the admission is normally made at the end of the year, which results in dissatisfied applicants. Finally, the university is not optimising its IT system to ensure effective service delivery.

5.8 Summary

This chapter focused on discussing the themes developed, and the research questions posed in Chapter One were revisited to assess whether it could be addressed by the study. Specifically, this chapter documented how the themes that emerged from the research findings were discussed, with the view to document how performance can be improved in practice. A detailed description of each theme assisted in mapping out the business processes.

CHAPTER SIX: CONCLUSION

6.1 Introduction

This chapter presents a conclusion of the study, which is done by determining whether the research objectives and research aims have been met. Possible future research is recommended, and the chapter concludes with providing recommendations.

The objectives of this thesis are:

- I. To assess the current residence application and admission process in order to identify the gaps and propose a new process using BPR.
- II. To investigate the extent to which the information system is used in the residence application and admission process.
- III. To propose an integrated comprehensive BPM framework required for the residence application and admission process.

6.2 Linking the results with the objectives

The research objectives set out in Chapter One are answered in this section, using the results of the case study discussed in Chapter Five. Findings have shown that RAAP requires reengineering in order to improve student satisfaction with the process.

Objective 1: To assess the current residence application and admission process in order to identify the gaps and propose a new process using BPR

Chapter Five provides a detailed analysis of the residence and admission process, beginning with identifying the bottlenecks affecting the ability of the university's administrative process to function optimally. The participants' views are presented in the findings and by means of the "As-Is" process map. After the analysis of the "As-Is" process map, the focus turns to eliminating redundant processes, leading to the development of the "To-Be" process. The intent of "To-Be" is to ensure that the reengineering process does not have the weaknesses identified in the "As-Is" process. This objective has therefore been met.

Objective 2: To investigate the extent to which the information system is used in the residence application and admission process

The case study findings express the view that the current information system is not fully optimised. The identified barriers can easily be resolved by simply correcting

the system setup and do minor system developments. The university does have the appropriate information technology infrastructure. There is consensus among the participants that most bottlenecks are based on redundancy that can be corrected. Consequently, the proposed “To-Be” process requires integration of the residence application and admission process with the ERP system.

Objective 3: To propose an integrated comprehensive BPM framework for the residence application and admission process

Business process management involves role clarification of the university’s administrative offices as well as the use of technological solutions available to the university. The Application Office, Residence Office, and faculty offices have a defined set of activities relating to RAAP, with the aim to respond to applicants. The “To-Be” RAAP model requires that the current ERP system be optimised, which will result in BPR (See section 5.1.2).

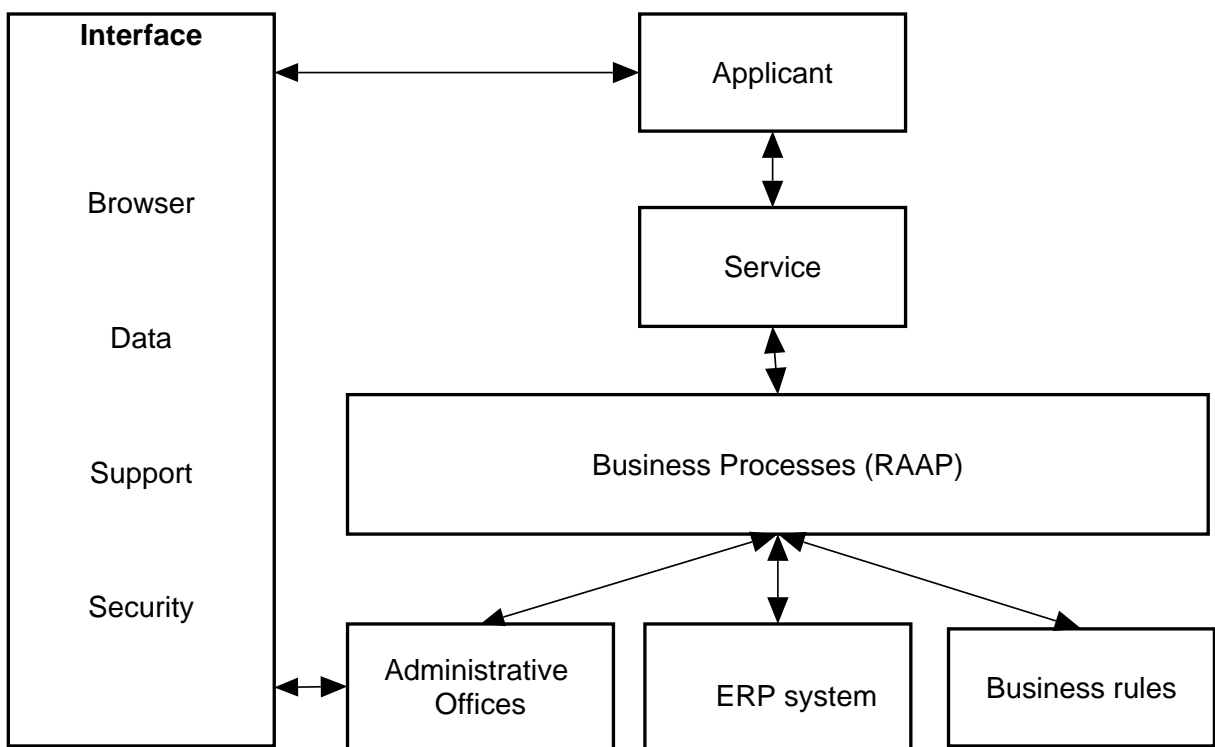


Figure 6.1: RAAP based on the work-centred analysis (WCA) framework
 (Source: Reijers & Mansar, 2005:292)

The BPM framework presented in section 2.1.2 has been reconfigured to improve the inefficient and ineffective processes within RAAP. After all, business process reengineering aims to align the university’s administrative activities with the applicants’ expectations. The application of the BPM framework (Figure 6.2), to the

current RAAP activities requires the integration of all university administrative processes in order to address the problems presented in section 5.2.1.1.

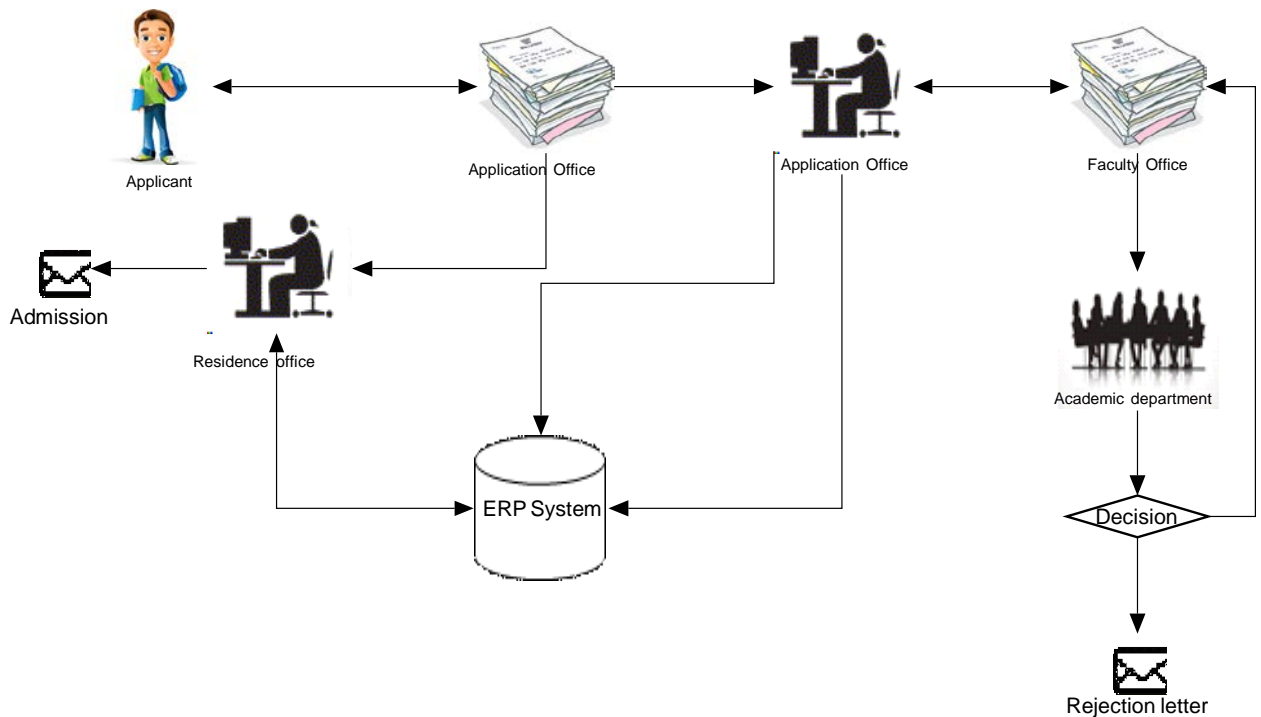


Figure 6.2: RAAP “As-Is”

The IT infrastructure will enable the required transformation of RAAP. The RAAP integration proposal will lead to improved flow of information between different university departments and the use of the ERP system with browser interactions between applicants and administrators, aimed at streamlining the process. However, the application of the ERP system for RAAP will require the use of explicit business rules, which will define the admission requirements for both academic and residential purposes to ensure that the correct action is taken when required to respond to student applications. These business rules will be used as follows, for example:

- Admission requirements are populated in the ERP system and facilitate an automatic response in the event that the applicant does not meet the minimum requirements
- Administrators are given the ability to request reports based on departmental requirements and selection decisions are made based on the availability of space
- The Residence Office is given the ability to respond speedily to applications

The expected result of this process will be a new RAAP system, presented in Figure 6.3.

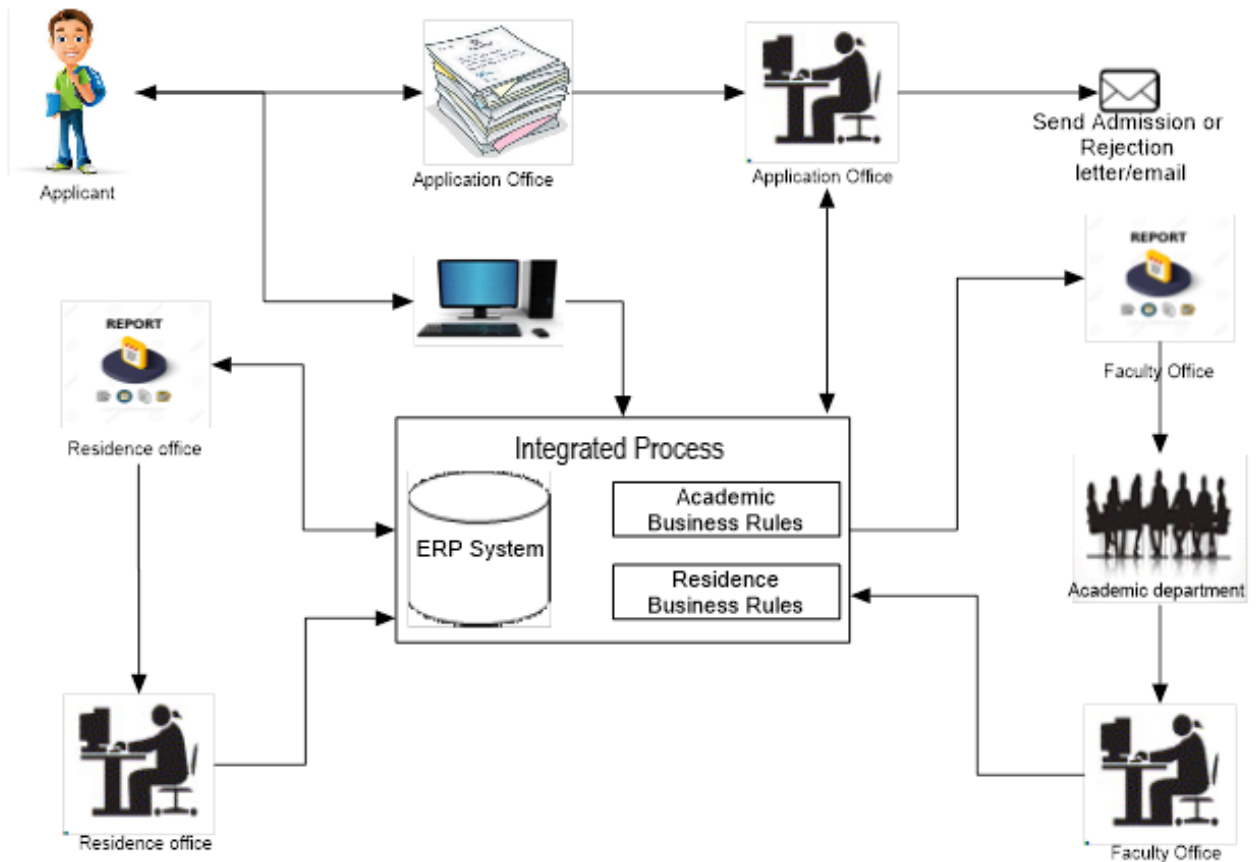


Figure 6.3: RAAP “To-Be”

The aforementioned objectives assisted in the development of the recommendations presented in section 6.6.

6.3 The aim of the study

The aim of the study is to explore how students and administrators view the residence application and admission process. A further aim is to explore how the processes can be reengineered to fulfil the requirements of the students and administrators. It is concluded that the study has achieved its aim, because all the data used in this study emanated from the interviews conducted with university administrators (Table 4.1) and student leaders (Table 4.2), which resulted in the findings that have led to the proposed RAAP “To-Be” model, and finally, to the recommendations in section 6.5.

6.4 Research problem revisited

The study intends to evaluate the information flow during the residency application and admission of students at the university, which involves business processes that

are inefficient and ineffective. This results firstly in mistakes being made by administrators, and secondly in dissatisfied students.

This section presents concluding remarks on the insights gained during study, with the view to determine whether the study was able to address the research problem. The participants' experience with RAAP has enabled the researcher to identify gaps that need to be addressed by means of the proposed "To-Be" process. The RAAP participants expressed dissatisfaction with the process, because it is too protracted and decision making regarding the admission are normally only made at the end of the year. Finally, the university is not optimising its IT system to ensure effective service delivery. The university administration process has continued to evolve while the researcher was conducting the study. Some of the aspects regarding the academic application are already implemented, while in terms of the phenomenon itself, the issue of dissatisfied applicants still persists, hence the presentation of RAAP "To-Be" in section 5.1.2 and Figure 6.3.

6.5 Future research

As mentioned in the limitations section (section 1.10), it is a mammoth task to define the cost benefits of implementing RAAP, as there are challenges associated with determining or placing a value on customer satisfaction in a non-profit organisation. Future research can be conducted in terms of analysing the cost benefits of a fully automated RAAP, taking into consideration human resources costs and the initial capital cost for system development, with the aim of assisting tertiary institutions to make informed decisions based on possible returns on capital investment.

6.6 Recommendations

The scope of study is defined by the research problem, namely that the information flow during the application and admission of students for residency at universities, involves business processes that are inefficient and ineffective. This results firstly in mistakes being made by administrators, and secondly in dissatisfied students. To date, little attention has been given to BPR in the context of tertiary institutions in South Africa.

This study links the importance of business processes, IT systems, and decision making, which is supported by organisational structure. Finally, the study makes the following recommendations:

- I. The university needs to set up its own process review mechanisms that best fit their environment and assist with achieving its goals effectively and efficiently.

- II. Moreover, since reengineering processes require knowledge transfer, for process mapping and system development the university needs to develop a new culture that embraces staff development, responsiveness, and accountability.
- III. The university has to design an incentive mechanism to encourage innovation and participation in change management activities aimed at improving student experience.
- IV. The scope of the admission committee needs to be extended to include the monitoring and tracking of proposed areas of improvement in the university administrative process.
- V. Deploy the proposed reengineering processes to ensure the effective use of ERP system processes by implementing a pilot test and monitoring the progress as well as taking corrective actions based on feedback from staff.

REFERENCES

- Aguilar-Savén, R.S. 2004. Business process modelling: review and framework. *International Journal of Production Economics*, (90):129-149.
- Ahmad, H., Francis, A. & Zairi, M. 2007. Business process reengineering: critical success factors in higher education. *Business Process Management Journal*, 13(3):451-469.
- Aureli, S. & Salvatori, F. 2012. An investigation on possible links between risk management, performance measurement and reward schemes. *Journal of Accounting and Management Information Systems*, 11(3):306-334.
- Antoniadis, I., Tsiakiris, T. & Tsopogloy, S. 2015. Business Intelligence during times of crisis: adoption and usage of ERP systems by SMEs. *Procedia - Social and Behavioural Sciences*, 175:299-307.
- Ashogbon, K. 2012. *Achieving business process improvement through knowledge management: a case study with ABB Marine and Cranes, Finland*. Bachelor's thesis. HAMK University of Applied Sciences.
- Attaran, M. 2003. Information technology and business-process redesign. *Business Process Management Journal*, 9(4):440-458.
- Attaran, M. 2004. Exploring the relationship between information technology and business process reengineering. *Information & Management*, 41(5):585-596.
- Bandara, W., Chand, D.R., Chircu, A.M., Hintringer, S., Karagiannis, D., Recker, J.C., Van Rensburg, A. et al. 2010. Business process management education in academia: Status, challenges, and recommendations. *Communications of the Association for Information Systems*, 27:743-776.
- Banks, M.S., Onita, C.G. & Kettinger, W.J. 2013. IT enabled co-creation platforms: tapping the power of the prosumer. *Journal of Information Technology Management*, 24(1):50.
- Beckmann, G. & Krause, D. 2013. Process visualisation of product family development methods. *Proceedings*. The 19th International Conference on Engineering Design (ICED13), Seoul, Korea, 19-22 August.
- Besson, P. & Rowe, F. 2012. Strategising information systems-enabled organisational transformation: a transdisciplinary review and new directions. *The Journal of Strategic Information Systems*, 21(2):103-124.
- Bierstaker, J.L., Hunton, J.E. & Thibodeau, J.C. 2009. Do client-prepared internal control documentation and business process flowcharts help or hinder an auditor's ability to identify missing controls? *Auditing: A Journal of Practice & Theory*, 28(1):79-94.
- Brooke, J. 2013. SUS: a retrospective. *Journal of Usability Studies*, (8):29-40.
- Brown, R., Recker, J. & West, S. 2011. Using virtual worlds for collaborative business process modelling. *Business Process Management Journal*, 17(3):546-564.
- Bordeianu, S. & Kohl, L. 2015. The voyage home: New Mexico libraries migrate to WMS, OCLC's cloud-based ILS. *Technical Services Quarterly*, 32(3):274-293.

- Borgianni, Y., Cascini, G. & Rotini, F. 2015. Business process reengineering driven by customer value: a support for undertaking decisions under uncertainty conditions. *Computers in Industry*, 68:132-147.
- Castellano, M.B. 2004. Ethics of Aboriginal research. *Journal of Aboriginal Health*, 1(1):98-114.
- Cetindamar, D., Phaal, R. & Probert, D. 2009. Understanding technology management as a dynamic capability: a framework for technology management activities. *Technovation*, 29(4):237-246.
- Charfi, A. & Mezini, M. 2004. Hybrid web service composition: business processes meet business rules. *Proceedings. The 2nd international Conference on Service Oriented Computing (ICSOC '04)*, New York, USA, 15-19 November: 30-38.
- Chen, L. & Manuel, N. 2010. Business process integration of multiple customer order review system. *IEEE*, 57(3):502-512.
- Chong, S. 2007. Business process management for SMEs: an exploratory study of implementation factors for the Australian wine industry. *Journal of Information Systems and Small Business*, 1:41-58.
- Coghlan, D. & Brydon-Miller, M. 2014. *The SAGE encyclopaedia of action research*. London, Sage.
- Collis, J. & Hussey, R. 2014. *Business research: a practical guide for undergraduate and postgraduate students*. Hampshire, UK: Palgrave Macmillan.
- Daines, III, J.G. 2011. Re-engineering archives: Business Process Management (BPM) and the quest for archival efficiency. *American Archivist*, 74(1):123-157.
- Davenport, T.H., Harris, J.G. & Cantrell, S. 2004. Enterprise systems and ongoing process change. *Business Process Management Journal*, 10(1):16-26.
- Devillers, M., 2011. *Business process modelling as a means to bridge the business-IT divide*. Master's Thesis, Information Sciences. Radboud University Nijmegen.
- Dorgan, O.I. 2013. The impact on the operational performance of world class manufacturing strategies: a company application. *International Journal of Business, Humanities and Technology*, 3(8):141-149.
- Douglas, J., McClelland, R. & Davies, J. 2008. The development of a conceptual model of student satisfaction with their experience in higher education. *Quality Assurance in Education*, 6(1):19-35.
- Doyle, J.K. 2004. Introduction to interviewing techniques. In Wood, D.W. (ed.), *Handbook for IQP advisors and students*. Worcester, MA: Worcester Polytechnic Institute.
- Dumas, M., La Rosa, M., Mendling, J. & Reijers, H.A. 2013. *Fundamentals of business process management*. Heidelberg: Springer.
- Eardley, A., Shah, H. & Radman, A., 2008. A model for improving the role of IT in BPR. *Business Process Management Journal*, 14(5):629-653.

- Eisenhardt, K.M. 1989. Building theories from case study research. *Academy of Management Review*, 14:532-550.
- Everest, T. 2014. Resolving the qualitative-quantitative debate in healthcare research. *Medical Practice and Reviews*, 5(1):6-15.
- Faganel, A. 2010. Quality perception gap inside the higher education institution. *International Journal of Academic Research*, 2(1):213-15.
- Flynn, B.B., Sakakibara, S., Schroeder, R.G., Bates, K.A. & Flynn, E.J. 1990. Empirical research methods in operations management. *Journal of Operations Management*, 9(2):250-284.
- Fernández, H.F., Palacios-González, E., García-Díaz, V., G-Bustelo, B.C.P., Martínez, O.S., & Lovelle, M.J.C. 2010. SBPMN - an easier business process modelling notation for business users. *Computer Standards & Interfaces*, 32:18-28.
- Fisher, M.D. 2006. *Staff perceptions of an enterprise resource planning system implementation: a case study of three Australian universities*. Doctoral dissertation. Faculty of Arts, Humanities and Education, Central Queensland University.
- Fishwick, P.A. 2012. Panel on grand challenges for modelling and simulation. *Proceedings. The Winter Simulation Conference (WSC)*, Berlin, Germany, 9-12 December: 1-12.
- Gehlot, V. & C. Nigro. 2010. Coloured Petri Nets. *Proceedings. The 2010 Winter Simulation Conference*, Baltimore, MD, USA, 5-8 December. <http://www.informs-sim.org/wsc10papers/012.pdf>.
- Georgantzas, N.C. & Katsamakas, E.G. 2010. Performance effects of information systems integration: a system dynamics study in media firm. *Business Process Management*, 16(5):822-846.
- Georgakopoulos, D., Hornick, M. & Sheth, A. 1995. An overview of workflow management: from process modelling to workflow automation infrastructure. *Distributed and Parallel Databases*, 3(2):119-153.
- Giaglis, G.M. 2001. A taxonomy of business process modelling and information systems modelling techniques. *International Journal of Flexible Manufacturing Systems*, 13(2):209-228.
- Gray, D. 2004. *Doing research in the real world*. London, Thousand Oaks, CA: Sage.
- Guardia, G., Vêncio, R. & De Farias, C. 2012: A UML profile for the OBO relation ontology. *BMC Genomics*, 13(Suppl. 5):S3.
- Guba, E.G. (ed). 1990. *The paradigm dialog*. Newbury Park, CA: Sage.
- Gunasekaran, A. & Nath, B. 1997. The role of information technology in business process reengineering. *International Journal of Production Economics*, 50(2-3):91-104.
- Hammer, M. 2004. Deep change. *Harvard Business Review*, 82:84-93.
- Hammer, M. 2007. The process audit. *Harvard Business Review*, 85(4):111-119.

- Hammer, M. & Champy, J. 1993. *Re-engineering the corporation: a manifesto for business revolution*. New York: Harper Business.
- Hartmann, A. 2006. The role of organisational culture in motivating innovative behaviour in construction firms. *Construction Innovation*, 6(3):159-172.
- Harmon, P. 2010. The scope and evolution of business process management. In Vom Brocke, J. & Rosemann, M. (eds.), *Handbook on business process management: introduction, methods and information systems*, Vol.1. Berlin: Springer: 37-81.
- Jebreen, I. 2012. Using inductive approach as research strategy in requirements engineering. *International Journal of Computer and Information Technology*, 1(2):162-173.
- Khan, M.R. 2000. Business process reengineering of an air cargo handling process. *International Journal of Production Economics*, 63(1):99-108.
- Kim, Y.G. 1995. Process modelling for BPR: event-process chain approach. *Proceedings. International Conference on Information Systems*, Amsterdam, Netherlands, 10-13 December: 109-121.
- Kwahk, K.Y. & Kim, Y.G. 1999. Supporting business process redesign using cognitive maps. *Decision Support Systems*, 25(2):155-178.
- Kimani, S.W., Kagira, E.K. & Kendi, L. 2011. Comparative analysis of business students perceptions of service quality offered in Kenyan Universities. *International Journal of Business Administration*, 2(1):98.
- Krauss, S.E. 2005. Research paradigms and meaning making: a primer. *The Qualitative Report*, 10(4):758-770.
- Kocaoglu, B. & Acar, A. 2015. Developing an ERP triggered business process improvement cycle from a case company. *Journal of Technology and Innovation Management*, 18(2):107-144.
- Kocaoglu, B., Acar, A.Z. & Yilmaz, B. 2014. Demand forecast, up-to-date models and suggestions for improvement an example of a business. *Journal of Global Strategic Management*, 26-37.
- Koubarakis, M. & Plexousakis, D. 2002. A formal framework for business process modelling and design. *Information Systems*, 27(5):299-319.
- Kontic, L. 2014. Measuring service quality in higher education: the case of Serbia. *Proceedings. The international conference on management, knowledge and learning*, Portoroz, Slovenia, 25-27 June: 25-27.
- Kotlarsky, J. & Oshri, I. 2005. Social ties, knowledge sharing and successful collaboration in globally distributed system development projects. *European Journal of Information Systems*, 14(1):37-48.
- Kühne, S., Kern, H., Gruhn, V. & Laue, R. 2010. Business process modelling with continuous validation. *Journal of Software: Evolution and Process*, 22(6-7):547-566.

- Kyupova, B., Rees, J. & Penev, K. 2009. Knowledge management applied to business process reengineering. *Proceedings*. International Conference on Software, Services & Semantic Technologies, Sofia, Bulgaria, 28-29 October.
- La Rosa, M., Dumas, M., Ter Hofstede, A.H., Mendling, J. & Gottschalk, F. 2008. Beyond control-flow: extending business process configuration to roles and objects. *Proceedings*. International Conference on Conceptual Modelling, 20 October: 199-215. https://doi.org/10.1007/978-3-540-87877-3_16.
- Leopold, H., Mendling, J., Reijers, H.A. & La Rosa, M. 2014. Simplifying process model abstraction: techniques for generating model names. *Information Systems*, 39:134-151.
- Littleton, V., Meemon, N., Breen, G., Paek, S., Loyal, M., Ellis, N. & Wan, T.T. 2010. An ethical analysis of professional codes in health and medical care. *Ethics & Medicine*, 26(1): 25-48.
- Lopez-Fersno, P. 2010. Implementation of an integrated management system in an airline: a case study. *The TQM Journal*, 22(6):629-647.
- Li, Z., Hu, H. & Jeng, M. 2004. An algorithm for elementary siphons in PN. *Proceedings*. 2004 IEEE International Conference on Networking, Sensing and Control, Taipei, Taiwan, 21-23 March: 519-524. doi:10.1109/ICNSC.2004.1297493.
- Li, W.Z., Wu, N. & Zhou, M.C. 2012. Deadlock control of automated manufacturing systems based on Petri Nets: a literature review. *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)*, 42(4):432-462.
- Liu, Y. & Iijima, J. 2015. Business process simulation in the context of enterprise engineering. *Journal of Simulation*, 9(3):206-222.
- Mafuwane, B.M. 2011. The contribution of instructional leadership on learner performance. PhD thesis. University of Pretoria, South Africa.
- Malhotra, R. & Temponi, C. 2010. Critical decisions for ERP integration: small business issues. *Information Management*, 30(1):28-37.
- Malinova, M., Leopold, H. & Mendling, J. 2014. *A meta-model for process map design*. http://www.henrikleopold.com/wp-content/uploads/2014/04/2014_CAISE_Forum_Meta-ModelForProcessMapDesign.pdf. [Accessed: July 28, 2014].
- McAdam, R. & McCormack, D. 2001. Integrating business processes for global alignment and supply chain management. *Business Process Management Journal*, 7(2):113-130. <https://doi.org/10.1108/14637150110389696>.
- McDermid, D. 1998. The development of the business rules diagram. PhD thesis. Curtin University of Technology.
- McDermid, D.C. 2003. Integrated business process management: using state-based business rules to communicate between disparate stakeholders. *Proceedings*. International Conference on Business Process Management, Eindhoven, the Netherlands, 26-27 June: 58-71.

- McGaughey, R.E. & Gunasekaran, A. 2007. Enterprise resource planning (ERP): past, present and future. *International Journal of Enterprise Information Systems*, 3(3):23-35.
- McShane, S.L. & Von Glinow, M.A. 2009. *Organisational behaviour*. 2nd ed. Boston: McGraw-Hill.
- Medina-Mora, R., Winograd, T., Flores, R. & Flores, F. 1993. The action workflow approach to workflow management technology. *The Information Society*, 9(4):391-404.
- Mekonnen, A. 2011. *Uses and applications of quality engineering: a case of Ethiopia Plastic Share Company*. Master's Thesis. Addis Ababa Institute of Technology, Ethiopia.
- Mending, J., Reijers, H.A. & Recker, J. 2010. Activity labelling in process modelling: empirical insights and recommendations. *Information Systems*, 35(4):467-482.
- Mersha, G. 2004. *Business process reengineering: a focus on time performance: a case study on Ethiopian airlines*. Master's thesis. Addis Ababa University, Ethiopia.
- Miles, M. & Huberman, M. 1994. *Qualitative data analysis*. 2nd ed. Beverly Hills, CA: Sage.
- Mili, H., Jaoude, G.B., Lefebvre, E., Tremblay, G. & Petrenko, A. 2004. Business process modelling languages: sorting through the alphabet soup. *ACM Comput. Surv.*, 43(2010):4:1-4. doi:10.1145/1824795.1824799.
- Morgan, D.L. 2007. Paradigms lost and pragmatism regained: methodological implications of combining qualitative and quantitative methods. *Journal of Mixed Methods Research*, 1(1):48-76.
- Monk, E. & Wagner, B. 2013. *Concepts in Enterprise Resource Planning*. 4th ed. Independence, New York, KY: Course Technology.
- Mukesh, K., Kee, F.T. & Manshor, A.T. 2009. Determining the relative importance of critical factors in delivering service quality of banks: an application of dominance analysis in SERVQUAL model. *Managing Service Quality*, 19(2):211-28.
- Murphy, K.E. & Simon, S.J. 2002. Intangible benefits valuation in ERP projects. *Information Systems Journal*, 12(4):301-320.
- Mwishwa, Y.H. 2014. A framework for improving capabilities of Tanzanian contracting parties practices through adopting three philosophies: Lean, BPR and the Capability Maturity Model. *Journal of Business Management and Applied Economics*, 3(2):22-34.
- Myers, M.D. 2009. *Qualitative research in business & management*. London: Sage.
- Nelson, O., Ojebuyi, B.R. & Salawu, A. (eds). 2016. *Impacts of the media on African socio-economic development*. IGI Global.
- Neuman, W.L. 2010. *Social research methods: qualitative and quantitative approaches*. Pearson education.
- Nyarko, I.K., Dorkenoo, C.B., Semordey, E.Y. and Agbanu, P. 2016. Organisational structure as a logical tool for determining the flow of responsibility and authority. *International Journal of Management and Administrative Sciences (IJMAS)*, 3 (3): 1-19

- O'Neill, P. & Sohal, A.S. 1999. Business process reengineering: a review of recent literature. *Technovation*, 19(9):571-581.
- O'Leary, D.E. 1999. Reengineering and knowledge management. In Fensel, D. & Studer, R. (eds.), *Lecture Notes in Computer Science*. Springer: 1-12.
- Ozcelik, Y. 2010. Do business process reengineering projects payoff? Evidence from the United States. *International Journal of Project Management*, 28(3):7-13.
- Palvia, P., Mao, E., Salam, A. F. & Soliman, K.S. 2003. Management information Systems research: what's there in a methodology. *Communication of the Association for Information Systems*, 11:289-308.
- Parker L.D. 2003. Qualitative research in accounting and management: the emerging agenda. *Journal of Accounting and Finance*, 2:15-30.
- Pattanayak, S. & Royb, S. 2015. Synergising business process reengineering with enterprise resource planning system in capital goods industry. *Procedia-Social and Behavioural Sciences*, 189:471-487.
- Patton, M.Q. 2002. *Qualitative research and evaluation methods*. 3rd ed. Thousand Oaks, California: Sage.
- Peppard, J. 2000. Customer relationship management (CRM) in financial services. *European Management Journal*, 18(3):312-327.
- Peterson, J.S. 2014. Giftedness, trauma, and development: a qualitative, longitudinal case study. *Journal for the Education of the Gifted*, 37(4):295-318
- Pourshahid, A., Amyot, D., Peyton, L., Ghanavati, S., Chen, P., Weiss, M. & Forster, A.J. 2009. Business process management with the user requirements notation. *Electronic Commerce Research*, 9(4):269-316.
- Qu, S. & Dumay, J. 2011. The qualitative research interview. *Qualitative Research in Accounting & Management*, 8(3):238-264.
<https://doi.org/10.1108/11766091111162070>.
- Rahman, A.A., Ng, I.S., Sambassivan, M. & Wong, F. 2013. Training and organisational effectiveness: moderating role of knowledge management process. *European Journal of Training and Development*, 37(5):472-488.
- Rajasekar, S., Philominathan, P. & Chinnathambi, V. 2006. *Research Methodology*.
<https://arxiv.org/abs/physics/0601009>. [Accessed: 21 June 2014].
- Records, L.R. 2005. *The fusion of process and knowledge management*. BPTrends. September. <https://www.bptrends.com/the-fusion-of-process-and-knowledge-management/>. [Accessed: 22 May 2015].
- Reijers, H.A. & Mansar, L. 2005. Best practices in business process redesign: an overview and qualitative evaluation of successful redesign heuristics. *Omega*, 33(4):283-306.
- Resnik, D. 2011. Scientific research and the public trust. *Science and Engineering Ethics*, 17(3):399-409.
- Robbins, S.P. 2003. *Organisational behaviour*. 10th ed. Singapore: Pearson Education.

- Rowley, J. 2002. Using case studies in research. *Management Research News*, 25(1):16-27.
- Rosemann, M. & Vom Brocke J. 2010. The six core elements of business process management. In Vom Brocke, J. & Rosemann, M. (eds.), *Handbook on business process management*, Vol. 1. Heidelberg: Springer.
- Rowlands, B.H. 2005. Grounded in practise: using interpretive research to build theory. *The Electronic Journal of Business Research Methodology*, 3(1):81-92. <http://www.ejbrm.com>.
- Sajjad, F., Lee, H., Kamal, M. & Irani, Z. 2011. Workflow technology as an e-participation tool to support policy-making process. *Enterprise Information Management*, 24(2):197-212.
- Saldaña, J. 2015. *The coding manual for qualitative researchers*. Thousand Oaks, California: Sage.
- Saunders, M., Lewis, P. & Thornhill, A. 2009. *Research methods for business students*. 5th ed. Harlow: Pearson Education.
- Schultze, U. & Leidner, D.E. 2002. Studying knowledge management in information systems research: discourses and theoretical assumptions. *MIS Quarterly*, 26(3):213-242.
- Seddon, P.B., Calvert, C. & Yang, S. 2010. A multi-project model of key factors affecting organisational benefits from enterprise systems. *MIS quarterly*, 34(2):305-328.
- Shen, Y.C., Chen, P.S. & Wang, C.H. 2016. A study of enterprise resource planning (ERP) system performance measurement using the quantitative balanced scorecard approach. *Computers in Industry*, 75:27-139.
- Shin N. & Jemella, D.F. 2002. Business process reengineering and performance improvement: a case study of Chase Manhattan Bank, *Business Process Management*, 8(4):352-363.
- Sidorova, A. & Isik, O. 2010. Business process research: a cross-disciplinary review. *Business Process Management Journal*, 16:566-597.
- Silvestro, R. & Westley, C. 2002. Challenging the paradigm of the process enterprise: a case-study analysis of BPR implementation. *Omega: The International Journal of Management Science*, 30(3):215-225.
- Silverman, D. 2005. Instances or sequences? Improving the state of the art of qualitative research. *Forum: Qualitative Social Research*, 6(3):1-12. <http://www.qualitative-research.net/index.php/fqs/article/viewArticle/6/13>. [Accessed: 19 June 2014].
- Skok, W. & Legge, M. 2002. Evaluating enterprise resource planning (ERP) systems using an interpretive approach. *Knowledge and Process Management*, 9(2):72-82.
- Sullivan, D. 2004. *Proven portals: best practices for planning, designing, and developing enterprise portals*. Boston, MA: Pearson Education.
- Smirnov, S., Dijkman, R., Mendling, J. & Weske, M. 2010. Meronymy-based aggregation of activities in business process models. *Proceedings. The 29th International Conference on Conceptual Modelling*, Vancouver, BC, Canada, 1-4 November.

- Spies, M. 2010. An ontology modelling perspective on business reporting. *Information Systems*, 35(4):404-416.
- Sommer, R. 2011. Public sector ERP Implementation: successfully engaging middle-management. *Communications of the IBIMA*, Article ID 1624392011. <http://www.ibimapublishing.com/journals/CIBIMA/2011/162439/a162439.html>. [Accessed: July 14, 2014].
- Škerlavaj, M., Štemberger, M.I. & Dimovski, V., 2007. Organisational learning culture the missing link between business process change and organisational performance. *International journal of production economics*, 106(2):346-367.
- Svensson, G. & Wood, G. 2007. Are university students really customers? When illusion may lead to delusion for all. *International Journal of Educational Management*, 21(1):17-28
- Teece, D.J. 2007. Explicating dynamic capabilities: the nature and micro foundations of (sustainable) enterprise performance. *Strategic Management Journal*, 28(11):1319-1350.
- Terziovski, M., Fitzpatrick, P. & O'Neil, P. 2003. Successful predictors of business process reengineering (BPR) in financial services. *International Journal of Production Economics*, 84:35-50.
- Themistocleous, M., Irani, Z & Love, P.E.D. 2004. Evaluating the integration of supply chain information systems: a case study. *European Journal of Operational Research*, 159(2):393-405.
- Thomas, D.R. 2006. A general inductive approach for analysing qualitative evaluation data. *American Journal of Evaluation*, 27: 237-24.
- Thursby, J.G. & Kemp, S. 2002. Growth and productive efficiency of university intellectual property licensing. *Research Policy*, 31(1):109-124.
- Trkman, P. 2010. The critical success factors of business process management. *International Journal of Information Management*, 30(2):125-134.
- Trauth, E.M. 2001. The choice of qualitative methods in IS research. *In Qualitative research in IS: issues and trends*, 1-19.
- Tuli, F. 2010. The basis of distinction between qualitative and quantitative research in Social Science: reflection on ontological, epistemological and methodological perspectives. *Ethiopian Journal of Education and Sciences*, 6(1):102-103.
- Tsvetanov, Y. 2008. *Academic business processes*. <http://hdl.handle.net/10506/36>. [Access: 20 November 2015].
- Vaismoradi, M., Turunen, H. & Bondas, T. 2013. Content analysis and thematic analysis: Implications for conducting a qualitative descriptive study. *Nursing & Health Sciences*, 15(3):398-405.
- Van Beijnum, B.J.F., Widya, I., Marani, E. 2010. Modelling the vagus nerve system with the Unified Modelling Language. *Journal of Neuroscience Methods*, 193(2):307-320.

- Van der Aalst, W.M.P. 1999. Formalisation and verification of event-driven process chains. *Information & Software Technology*, 41:639-650.
- Van Dongen, B.F., Jansen-Vullers, M.H., Verbeek, H.M.W. & Van der Aalst, W.M.P. 2007. Verification of the SAP reference models using EPC reduction, state-space analysis, and invariants. *Computers in Industry*, 58(6):578-601.
- Vergidis, K., Tiwari, A. & Majeed, B. 2008. Business process analysis and optimisation: beyond reengineering. *IEEE Transactions on Systems, Man, and Cybernetics, Part C (Applications and Reviews)*, 38(1):69-82.
- Vosloo, J.J. 2014. A sport management programme for educator training in accordance with the diverse needs of South African Schools. PhD Thesis, North West University.
- Wedawatta, G., Ingirige, B. & Amaratunga, D. 2011. *Case study as a research strategy: investigating extreme weather resilience of construction SMEs in the UK*. <http://usir.salford.ac.uk/18250/1/6>. [Accessed: 19 June 2014].
- Wahyuni, D. 2012. The research design maze: understanding paradigms, cases, methods and methodologies. *Journal of Applied Management Accounting Research*, 10(1):69-80.
- Wang, M. & Wang, H. 2006. From process logic to business logic—a cognitive approach to business process management. *Information & Management*, 43(2):179-193. <http://hdl.handle.net/10722/135593>. [Accessed: 21 March 2016].
- Weerakkody, V., Janssen, M. & Dwivedi, Y.K. 2011. Transformational change and business process reengineering (BPR): lessons from the British and Dutch public sector. *Government Information Quarterly*, 28(3):320-328.
- Weske, M. 2007. *Business process management: concepts, methods*. Berlin Heidelberg: Springer-Verlag.
- Weske, M. 2012. *Business process management - concepts, languages, architectures*. 2nd ed. Heidelberg: Springer Verlag.
- Yang, W.P., Yang, P.H. & Chen, Y.J. 2013. Can one get fish and bear's paws at the same time. *Proceedings*. International Conference on the Modern Development of Humanities and Social Science, Hong Kong, China, 1-2 December: 239-246.
- Yen, H.C. & Yu, L.P. 2004. Dependability analysis of a class of probabilistic Petri Nets. *Proceedings*. 10th IEEE Pacific Rim International Symposium on Dependable Computing, Tahiti, French Polynesia, 3-5 March: 373-380.
- Yin, R.K. 1994. *Case study research: design and methods*. 2nd ed. Thousand Oaks: Sage.
- Yin, R.K. 2003. *Case study research: design and method*. 3rd ed. Thousand Oaks, London: Sage.
- Yuki, G.A. 2013. *Leadership in organisations*. India: Pearson Education.
- Zainal, Z. 2007. Case study as a research method. *Jurnal Kemanusiaan*, 9:1-6.
- Zur Muehlen, M. & Indulska, M. 2010. Modelling languages for business processes and business rules: a representational analysis. *Information Systems*, 35(4):379-390.

APPENDIX A: INTERVIEW QUESTIONS

Residence Office, Application Office, Faculty Office

RQ refers to Research Question

SRQ refers to Sub-Research Question

IQ refers to Interview Question

Problem statement: The flow of information of the application and registration admission for student residency between different departments within the university, involves business processes that are inefficient and ineffective, and it is unclear how it affects service deliver to the role players.

RQ1: What approaches can be used to improve the application and admission process of the role players at the selected tertiary institution?

SRQ 1.1: What are the users' experiences during the application and admission process at the selected tertiary institution?

IQ1: What is your role in application and admission process?

IQ2: What are the major activities in the application and admission process?

IQ3: What are the independent or dependent activities?

IQ4: How do you know when part of the process is done?

IQ5: Is there a rule document that governs each activity or process?

IQ6: Where in the process do you think activities are repeated?

IQ7: Are you able to track the status of the application?

SRQ 1.2: What techniques can be deployed to improve the residence application and admission process at the selected tertiary institution?

IQ8: What techniques do you have that the support application and admission process?

IQ9: How will this approach improve the process?

IQ10: Can you comfortably say all staff members clearly understand their role as per the workflow?

IQ11: What form of support does your office give to staff members who do not clearly understand their role in the business process?

IQ12: How are the suggestions regarding business process improvements managed in your department?

RQ2: How does the application and admission process affect service delivery to the role players at the selected tertiary institution?

SRQ 2.1: How does information flow during the application and admission process at the selected tertiary institution?

IQ13: What are the strengths and weaknesses of the current application and admission process?

IQ14: What parts of activities will you be prepared to eliminate in the process and why?

IQ15: Will there be some kind of application and admission process reengineering?

SRQ 2.2: How does information technology support the residence application and registration business processes at the selected tertiary institution?

IQ16: What will be the role of IT in the proposed application and admission process?

IQ17: What do you want the ERP system to achieve?

Student Leaders

Problem statement: The flow of information of the application and registration admission for student residency between different departments within the university, involves business processes that are inefficient and ineffective, and it is unclear how it affects service deliver to the role players.

RQ1: What strategies can be used to improve the application and admission process of the role players at the selected tertiary institution?

SRQ 1.1: What are the users' experiences during the application and admission process at the selected tertiary institution?

IQ1: How did you submit your application form?

IQ2: Did the university acknowledge receipt of your application?

IQ3: When did you receive a response from the university regarding your academic application?

IQ4: When did you receive a response from the university regarding your residence application?

IQ5: In terms of your role as student leaders, what general queries have you received pertaining to the application and admission?

APPENDIX B: UNIVERSITY ADMINISTRATOR INTERVIEWS

IQ	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6	Participant 7	Participant 8	Participant 9	Participant 10
SRQ 1.1: What are the users' experiences during the application and admission process at the selected tertiary institution?										
IQ 1	Responsible for capturing the application form on system (ITS) and sending academic forms to faculties and forms to Residence Office.	I'm responsible for distributing of the application from the admission department to different academic departments in the faculty.	Receiving and capturing of the application form into IT system, and identification of available spaces in the residence and finally, allocating admission or regret status to the applicant. The system then generates letters to be send via mail to the applicants.	We receive the application forms from the Admission and Registration Centre (ARC) together with a checklist (indicates the number and names) then forward the forms to departments for a selection.	I am doing various activities – responsible for receiving and issuing of application forms; I then check the correctness of the forms received and supporting document are attached.	I'm responsible [for] capturing of the residence application forms on [the] system followed by the identification of available beds or spaces in residence as part of residence administrator's function.	It involves identification of available beds in residence followed by allocation of qualify applicants	Checking the correctness of forms received, followed by capturing the forms on the IT systems. Finally, sending the forms [to] the relevant departments.	Distribution of application forms to their respective academic departments, and academic status of applicants to Application Office.	We are responsible for processing of residence application forms, and allocations.
IQ 2	Capturing biographical information and checking the correctness of the forms.	Receiving and sending application forms.	Capturing personal information of the applicant; capturing the application into the residence system. Receive academic	We check applications of returning students if they have attached their academic records, if not we print out such records then include it	The issuing and receiving application forms, followed by capturing personal information on the system, and preferred academic	Activities involve capturing of biographic information, identification available spaces in residences and finally, loading	Determining available beds, capturing personal information and placement of applications.	Received, sending the forms [to] the relevant departments. After receiving the academic status of the applicants, forms are sent	Receiving application forms form Application Office, followed by sending them to academic departments.	Identification of available spaces, which is done by processing returning students. Loading of new applicants on dummy

			status of the application and allocate the residence status. Send provisional acceptance letter or regret letter.	to the application forms received.	courses, sending application forms to the respective departments. Receiving academic status from the faculty and sending response letter to applicants.	of academic status and make final selection.		to Application Office.		residence. Finally, the admission.
IQ 3	Correctness of the forms and application fees.	Capturing of the forms by student admissions and receiving the forms.	Receiving application forms from student admissions; receive status of the academic application.	Academic selection committee decision on applicant status will be processed by Application Office, only after the faculty has developed lists of applicants and the outcome of the committee.	Receipt of application forms, and academic status.	Capturing of application forms, receiving of academic status and identification of available spaces.	Residence Office depends on the availability of the academic status in order for them to allocate space to the applicants.	Academic department are only able to make a determination on the application received, which are captured on a spreadsheet, which consists of the outcomes, then sent to Application Office.	The process is initiated by the arrival of the application form, which result in the setting up of [the] selection committee.	We cannot process forms that we did not receive, and we are not able to allocate space to applicants if we do not have their academic status.
IQ 4	Manager signing off forms to send to the faculties and Residence Office.	Sending the list of provisionally accepted students and regretted students to Application	Sending out provisional residence accepted or regret letter.	When the forms received from the department [are] signed, stamped, and marked for a certain status.	Departmentally when we are sending off application forms, we use a checklist to ensure all supporting documents are	When we receive academic status of the applicants, and allocating residence status.	We are privy to the operation of other departments; however, on our site we can deduce that [the] selection process is	Our supervisor advises us on the when and how of the process; basically directs all out activities. From receiving of	From our side signing of applications, from the department site receipt of forms and their status.	Student sending us their academic provisional acceptance letter.

		Office.			submitted and forms are correctly captured.		complete when we receive academic letters from the applicants.	forms ensuring they are captured, followed by sending them off to their respective departments.		
IQ 5	Not sure.	Minimum requirement for admission.	Placement policy.	Yes, the admission criteria is used.	Minimum requirement for admission, based on student handbook.	Placement policy.	Placement policy.	Student handbook.	Student handbook.	Placement policy.
IQ 6	After I have captured the form, I don't [know] what happens in the faculty and residence process.	I don't know.	Capturing of personal information, by Application Office and Residence Office.	Capturing of the academic status once we receive the application forms on the spreadsheet, which is something similar to what the Admission Office does on ITS.	Not sure.	I'm privy to their operations.	Student sending us their provisional acceptance letter, we can run the report. Applicants are sending us the information that is readily available on IT system.	I'm not sure if there is need to populate the academic status on the spreadsheet, and send that information to Application Office for capturing. I can perform that function and avoid documents moving one department to the other.	I'm not sure of what is done in other departments.	Application Office captures the similar information on system, e.g. personal information and academic status. The only difference is choice of residence.
IQ 7	No. we have timelines.	No, we have timelines.	Yes.	Yes.	We provide the time when the faculty must return the forms with the	Department sets its timeline for receiving reapplication forms for	No we are not able to track the progress on individual applicants, we		No, we depend on scheduled meeting dates to inform our operations.	We need application form tracking systems, which will provide an

					academic status to the department.	current student, which helps in the identification of available beds. However, we can't track the academic selection process.	depend on information given to us by the departments.			automated way for applicants to track the status of their applications and for administrators to manage the applications and admissions.
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SRQ 1.2: What techniques can be deployed to improve the residence application and admission process at the selected tertiary institution?

IQ 8	We use the IT system; however, it has a limited functionality. Students are not able use it to apply. We mainly use the IT system after the application forms are received. However, we need to develop some functionalities that will allow automatic selection.	Yes, used it to view the status of the application.	We have a checklist linked to the workflow. However, it does not assist us with the forms that are received late from the Application Office or that are mistakenly send to the academic department, which results in delays with capturing.	We use [the] IT system to capture forms that we have received. Timeline for the opening and closing of applications. Unfortunately, we sometimes get forms after the closing of applications.	All forms received from students are captured on the IT system, which include their details, personal details and preferred course. We have workflow, which is reviewed. Annually	The use of ERP system, workflow and regular review or current process, which is normally done in our planning meeting. However, we attend to some operational challenges in our staff meetings.	We basically use [a] timeline, as per faculty dates, which informs the departmental meetings.	We use [a] checklist with [a] clear timeline; we do not [use] IT systems in our application and selection process.	We are advised by our manger on what to do, and when to do it.	We have developed a workflow diagram. Limited use of ERP enables the perpetuation of [a] prolonged decision making process.
IQ 9	Most of the forms we receive are hand delivered followed post.	We have an annual workshop where we discuss our	The ERP system needs to function better, which ensures the	We noticed applications do not reach on time to ARC once the	The register organises admission committee, which view the	We are a stakeholder in application and admission committee,	In our application and registration workshop this was presented	The leadership of the faculty provide operational plan, which is	The Faculty Office or mangers present their plans, which	In our annual planning meeting, we review our processes and

	<p>If the university could ensure computer system, [it] allows students to apply from anywhere in country. This will reduce volume forms [that] we have to process; will improve our turnaround time.</p>	<p>process; in that workshop we then formulate new workflow and identification of the required IT system support required to action the new process.</p>	<p>total eradication of manual forms transported between the departments.</p>	<p>selection has been done in the departments; sometimes not all the forms reach Admission as it was delivered to the departments, therefore we decided to have a turnaround/ schedule of when to return the delivered forms to the Faculty, then ARC.</p>	<p>application process on [an] annual basis and outline the application and registration process.</p>	<p>which deal with the application process; we provide our input in the meeting as agreed in our residence workshop.</p>	<p>and discussed.</p>	<p>discussed in our meeting, resulting in the development of consolidated workflow. The advantage of this approach no one can claim ignorance.</p>	<p>are then adopted by the faculty.</p>	<p>based on the current workflow, IT requirement, and budget requirement.</p>
<p>IQ 10</p>	<p>All staff members are trained on regular basis on the application process, which includes capturing of the application and admission forms, checking correctness of the forms, and where the forms must be sent for further</p>	<p>Yes, all staff members have to perform their functions, which reflect on their understanding of the departmental processes; only staff members who are competent, [are] allowed to work on the process; and training is</p>	<p>Yes, our administrators were part of the process design.</p>	<p>Yes.</p>	<p>The university provides annual workshop for all relevant staff members to participate in, and we have internal department workshops and meetings, provide adequate training for staff.</p>	<p>All staff members are inducted and trained in residence application and admission process.</p>	<p>The university has staff development department that is responsible for training, however, training related to operational processes is done through discussions in our meetings and workshops.</p>	<p>Our processes are discussed on [a] regular basis in our meeting; there is no excuse for not been competent.</p>	<p>Generally, speaking most of the staff employed in our faculty have extensive knowledge [on the] application process, and those who do have, we have [a] training program for them.</p>	<p>Yes, we have [an] intensive induction program, our department. Secondly, our meetings are based on our operational requirement; processes are discussed and adopted.</p>

	processing.	provided on [a] regular basis.								
IQ 11	We receive training on [a] regular basis.	Training from the department and staff development institution unit in respect of information systems.	We have departmental meeting, workshops, and training programs available.	We are given training on how to use certain options on (ERP) to extract the data that we need; furthermore, someone takes us through step-by-step through the process of handling applications.	Training, workbook, and supervision.	Experiences staff members, mentors, new staff members at the program, they will ask to explain residence application process before they are allowed to work on their own.	IT department provides system-related training for all new system development, and development are based on the input from staff in the department.	Support is based on process documentation and signing off function performed by staff members that are comfortable with the process. Our staff meeting deal [with] all issues relating to our process, resulting in staff members gaining confidence in ability.	The faculty manager engages with of us, with respect to our professional development. Based on these discussions, training and development will be contacted to provide [the] training required.	All staff members in residence are trained in the administrative function of the department, resulting in knowledge sharing during our meeting and workshops.
IQ 12	Not Sure.	During our meetings, staff members can recommend process improvement developments they will then refer ICT department for consideration.	We participate in the institutional admission committee, which review the application process on [a] regular basis; we then submit our department input on the process.	We discuss with them to see their effectiveness and establish how can be used as a control measure.	Admission committee meeting and departmental meetings.	Annual workshop and admission committee meeting.	They are normally initiated, IT department based on workshop that [is] held on [an] annual basis by the ERP vendor based on the developments done for other universities.	Our departmental meetings are used to discuss application processes and process improvement suggestion are considered,, however, institutionally discussions take place in	Process improvement is part of our management meeting, which help to resolve issues raised by the students. When there is need to provide technical support to application and	In out monthly meetings or workshops.

								application and registration committee.	admission processes, the office will then engage the IT department to advise them on IT requirement for their plans.	
SRQ 2.1: How does information flow during the application and admission process at the selected tertiary institution?										
IO 13	It is dual processes, which accommodates applicants from different social backgrounds and weakness it takes a long time for the processes to be concluded.	Manual application process does not affect any local student but has a huge impact to all outside Cape Town applicants; forms need to be sent to them if the additional information is required; it takes too long to get feedback.	It is a paper-based process, which depends on another department to send the application forms to us. They sometime get lost while being transported by messengers.	Not sure.	The strength accommodates applicants from all backgrounds with our dual application processes. The weakness is manual forms sent to the Faculty Office and Residence; they sometimes get lost in transit.	Not strength with the process. The issue is duplications in capturing of personal information. The dependence on faculties and [the] Application Office it sometimes frustrating especially when the delays in the delivery of forms; and we are at the tail end of the application and admission process.	Transportation of forms from Application Office, and applicants sending their provisional academic status from the academic department.	The fact that the process accommodates applicants from different backgrounds in terms of application methods; however, the problem of forms transported between departments and decisions not captured on system result in errors.		Manual forms are received from applicants, they are sent to faculties and Residence Office. Forms will then be return back to [the] Application Office with [the] academic status of the applicant.
IQ	Sending	Sending	Doing away	It is mainly a	Sending forms	One of the	Handling of	The manual	Selection	Receipt of

14	manual forms to faculties and residences, because forms get lost between the departments and no one takes responsibility .	forms to selection committee, we can use information system report to our selection; it does not have to [be] manual.	with manual forms; use the available system optimally, retrieve application report.	manual process, selection or admission is done by individuals or committee.	to faculties and Residence Office.	biggest challenges of manual forms been sent to respective departments, some forms do not reach their intended destination. Capturing everything can be done at the Application Office and will reduce the risk.	application forms, we have recommended the amendment of the application form, which will ask if [the] applicant requires residence, if yes, tick boxes. IT system development will [be] required for the implementation.	system does not provide a guarantee in compliance with rules and regulations, because the selection is mainly done manually and often results in errors that are being made.	committees, selection can [be] built into IT system using admission requirements which, will guide the applicants whether he/she qualifies. The faculty will be responsible for allocation guided by departmental targets.	application forms, and loading of forms; everything can be done at [the] Application Office. Our role will be run reports of what was captured by Application Office and faculty.
IQ 15	We will continue with dual application system processes; the plan is [to] eliminate paper work between the faculty and Residence Office.	in the future we plan to automate the selection process, which will reduce errors and complaints.	Our department depends on information received from other departments; this means if decisions in other departments are captured on the system, we do not need any forms to process the application; Application	I don't know.	The planned electronic application, we require reengineering of the current processes.	The automation of the application process, and review of the application form, which must include software development to accommodate the changes.	In our meeting we identify forms getting lost as problem, hence, we have requested the automation of the process. This means [the] Application Office will be [the] only office handling the forms.	The new application and admission process must reduce number of... in circulation; ensure the use of [the] IT system to communicate other departments' status on the process.	The reliance on manual forms creates a lot of problems for us. We are of the view [the] IT system can assist [in] ensuring that errors are managed better, and proper monitoring can be done.	The current RAAP does not optimise the IT system; the new process will focus on eliminating forms between departments and allows for the electronic applications.

Office will upload biographic information, and faculties upload academic status.

SRQ 2.2: How does information technology support the residence application and registration business processes at the selected tertiary institution?

<p>IQ 16</p>	<p>We have a software program that we use to load the forms; for the proposed system, the loading will be minimal, because students will capture their personal information themselves. Only a limited number of applications will be processed manually.</p>	<p>The minimum requirements will be part of the business rule and students or applicants will be able to immediately determine whether they meet the requirement or not. The selection committee will [be] dealing only with students that meet the minimum requirements.</p>	<p>We do have software and IT infrastructure to support residence application and admission process; however, we need to develop some functionalities that will allow to do automatic selection.</p>	<p>Will be used to capture the outcome of the selection committee.</p>	<p>We expect IT to be responsive to the needs of departments, which means integrating selection decisions and automation of selection, which can easily be done by integrating admission requirements.</p>	<p>We have developed a framework that needs IT to automate [the] residence application process, and provide feedback, automated response, on the academic status, meaning that everything will be captured at the Application Office, and faculties will run report and confirm selection based on available spaces, and same will be applicable.</p>	<p>The role [of] IT is to introduce the automation application forms, resulting [in] reducing the volume of paper transported between departments. Finally, reduce the forms that get lost between the departments.</p>	<p>Help with [the] integration of activities regarding the application and admission process, which will be helpful in assisting the university to improve its response time to the applicants.</p>	<p>To provide technical support to application for the proposed admission processes, which will basically ensure integration of processes done in different...</p>	<p>To enable the university to continue providing service to its different constituencies by ensuring the optimisation of the current system.</p>
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IO 17	<p>Reduce the amount of forms processed in a number of departments, which will mitigate the errors and enable the applicants or administrators to monitor and track forms. Basically help with the integration of separate systems and improve usability.</p>	<p>Increase accountability, improve productivity, eliminate errors and forms that getting lost between departments.</p>	<p>Reduce query regarding the selection processes; the processes will be system based, limited staff involvement in selection. No forms will be lost, and no late application will be received.</p>	<p>No forms will get lost between departments and selection decision will be based on system rules.</p>	<p>To improve efficiency by eliminating paperwork between the departments.</p>	<p>To improve the flow of application and admission decision between departments, in order to improve service delivery.</p>	<p>ERP will provide the administrators with the ability to optimise RAAP, means of report generation, tracking of application and the generation [of] instant responses.</p>	<p>Automation of the application process.</p>	<p>To improve response time, and quality of service provided by the university.</p>	<p>Better management of the application process, the integration of process across all departments.</p>
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APPENDIX C: STUDENT LEADER INTERVIEWS

Problem statement: The flow of information of the application and registration admission for student residency between different departments within the university, involves business processes that are inefficient and ineffective, and it is unclear how it affects service deliver to the role players.

RQ1: What strategies can be used to improve the application and admission process of the role players at the selected tertiary institution?

SRQ 1.1: What are the users' experiences during the application and admission process at the selected tertiary institution?

IQ1: How did you submit your application form?

P11: "I posted my application, after receiving the forms from a friend".

P12: "I received the forms during the university open day, and submitted them personally before the closing date".

P13: "My brother submitted the forms for me at the Application Office".

P14: "I [am] from the Northern Cape; I printed the forms from [the] website, after completion I posted them".

P15: "I posted my application".

IQ2: Did the university acknowledge receipt of your application?

P11: "No".

P12: "No".

P13: "I do not remember".

P14: "No".

P15: "No".

IQ3: When did you receive a response from the university regarding your academic application?

P11: "No response whatsoever. I called a couple of times in November and I was told I will be informed after examinations. In December, the staff did not pick-up my calls at all. Eventually in January, I had to come to Cape Town to enquire about my application. Again, no one was prepared to assist me until I reported the issue to SRC. It took at least two weeks for my status to be resolved".

P12: "You are reminding me of the frustrating and hopelessness I felt while I was waiting for response. I did not get a response from the university, and when I contacted the Faculty Office I was told staff [are] busy examination, can't respond to my application, I must wait for the department to contact me, they did not tell me exactly when will I get the response. I waited until mid-December for my response".

P13: "I received the response just before Christmas, however, it caused a lot of extreme anxiety and unhappiness, especial if you understand housing will not assist you if you do not have academic acceptance".

P14: "I received my acceptance letter towards the end of November".

P15: "It was either late in October or early November".

IQ4: When did you receive a response from the university regarding your residence application?

P11: "In November I called student housing enquiring about my application, and they told me they have received the application, however, they are not in a position to offer me residence because they are waiting for the academic selection."

P12: "I did not get a response from the Residence Office. I had to travel from the Eastern Cape to enquire about my application considering that [I] do not have any relative around Cape Town it was a risk that we should not be subjected to as students."

P13: "I contacted student housing, early in November and I was told I am on their list; however, they can [not] allocate residence to me because they require academic acceptance before they assist me. I had to fax the academic acceptance letter to housing in January, which was followed up by [a] phone call and they confirm receiving the fax and confirm my admission. The issue is why must I fax the letter that I received from the university back to the university, surely, these department belong in same university. They are not considering it costs money to fax".

P14: "After calling the student housing I was told that I will receive my form response before the end of the year, which arrived just early in January, as a result I did not enjoy my vacation. Notwithstanding the fact that I was told I do qualify for residence by a residence official during our telephone discussions"

P15: "I got it at end of November"

IQ5: In terms of your role as student leaders, what general queries have you received pertaining to the application and admission?

P11: "The university management does not understand, or they are deliberately ignoring students' issues with regard to the application processes. Firstly, on an annual basis the SRC raises issues encountered by students regarding the admission. We do not get suitable responses, e.g. at Wellington campus they are able respond to all their students before the end of the year, why is it not possible in Cape Town or Bellville. The issues are the same, the academic selection committee is taking their time to select students for the next academic year. The Application Office is not sending residence forms to the Residence Office, and the Residence Office is not capturing forms which were received after closing date".

P12: "I will be general on my response to these question, in order to provide you with [a] global view of the problem. The university has[a] timeline that are sacrosanct, students are expected to adhere to; on the other hand the university has [a] fluid response timeline which makes [it] impossible to hold the staff accountable for their failure to response to students queries and sending responses early in January, in some cases not response at all".

P13: "The fact that [the] university does not acknowledge they have received [my] application result in students having to spend a lot of money phoning around trying to get response, and in some cases having to travel without knowing their status".

P14: "We have two groups of students on our campus, Education and Management. Education students do receive their responses from the university for their academic applications. For residence, as student leaders we have to travel to Cape Town Campus to enquire about the status of our students, in most cases the Residence Office did not receive their application, which results in conflict between us and the management of Residence. Students complain about receiving their acceptance letter too late, resulting in them missing out on residence space".

P15: "We only deal will issues of limited residences and bias allocation of residences".

APPENDIX D: LETTER OF AUTHORISATION



I, Anthony Staak, in my capacity as DVC Academic at CPUT give consent in principle to allow Loki Manise, a student at the Cape Peninsula University of Technology, to collect data in this company as part of his/her M Tech (BIS) research. The student has explained to me the nature of his/her research and the nature of the data to be collected.

This consent in no way commits any individual staff member to participate in the research, and it is expected that the student will get explicit consent from any participants. I reserve the right to withdraw this permission at some future time.

In addition, the company's name may or may not be used as indicated below. (Tick as appropriate.)

	Thesis	Conference paper	Journal article	Research poster
Yes	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
No	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



Prof. Anthony Staak



<<insert date>>