

Assessing Security Control Framework Impact in the Retail Sector: What Value Can COBIT 5 Add to ITIL Adoption?

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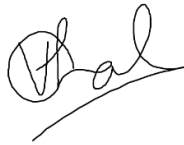
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Declaration

I hereby declare that this submission is the result of my own work and that, to the best of my knowledge, contains no material previously published or written by another person. Due acknowledgement is given where references have been made.

A handwritten signature in black ink, appearing to read 'Vishal', with a stylized flourish underneath.

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Vishal Chand Lal

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Abstract

Due to advancements in technology, retailers have gained the ability to reach out to a greater clientele base. Retailers have invested heavily in e-marketing in order to promote themselves to customers who would otherwise be out of reach of a physical retail shop. Online marketing allows retailers to advertise through AdWords, emails ad text messages and general web advertising. The consequence is that retailers have introduced many new IT processes to accommodate customer and business needs. While these developments allow retailers to maximize their earning potential, it also brings about risks such as those to information security, and increasing costs due to not implementing efficient IT processes. In order to maintain competitiveness in the market they need to implement best practices prescribed by industry standards and the use of control frameworks for risk management.

Since a business works as a system, various processes tend to be dependent on each other and therefore, it becomes necessary for service level agreements to be in place so that processes are not delayed. Failure to perform one critical task inappropriately could potentially cause a domino like effect on other processes. Unfortunately, not all task performers adhere to procedures and thus negatively impact the overall performance of the business, meaning that the business doesn't perform as efficiently as it would if processes were performed in accordance to the standards. To combat this issue, IT auditors use different audit tools to assess the efficiency of IT process and determine and recommend ways to improve these processes so that they perform at optimised levels.

The purpose of this research is to perform a maturity assessment on three IT processes used in a retail business. These processes are the Security Access Requests, the End of Day Process, and the Campaign Loading Process. The assessment process involves observing research participants performing these processes and then interviewing them to identify the issues that prevented the processes being performed at higher efficiency levels. The research participants were also asked to give each of their respective processes a maturity rating and how in their opinion these ratings could be improved. The maturity ratings were based on the Capability Maturity Model Interface from COBIT 5. The ratings were then analysed based on the observations

made and interview responses. The research question is: What Value Can COBIT 5 Add to ITIL Adoption?

The findings from the research show that there are many reasons that a process may not be performing at the best efficiency level. Factors contributing to the increase of a capability maturity level measure are: The existence of service level agreements, the intention to follow standard operating procedures, effective training and a commitment to continuous improvement. The absences of any of these are detrimental to business performance as whole. It was also discovered in the research that implementing recommendations for improvements have costs attached to them. These costs can be anything from financial, time consumption, and resources utilisation. The findings show that sometimes processes can be improved by using the services of in-house development teams. They also show that sometimes the best way to improve a process is to simply follow the required steps prescribed for the process. Therefore, the value we are looking at relates to the benefits or gains derived from adopting a control framework.

The outcome of this research provides a thorough understanding of using COBIT 5 CMMI to assess the level of maturity attained by various IT processes in the retail sector. It also enables readers to understand the problems faced by process operators that affect the level of efficiency. In addition, it provides a comprehensive understanding of ways in which processes could be improved and to support the businesses objectives. Moreover, it paves the way for research in the same area using more resources and assessment of a greater number of IT processes as well as related areas such as corporate social responsibility from an IT perspective.

Abbreviations

IT	Information Technology
ISO	International Organization for Standardization
COBIT	Control Objectives for Information and Related Technologies
CMMI	Capability Maturity Model Interface
APA	American Psychological Association
ERP	Enterprise Resource Planning
COSO	Committee of Sponsoring Organizations of the Treadway Commission
CFO	Chief Financial Officer
EFTPOS	Electronic Funds Transfer Point of Sale
BBR	Business Benefits Realisation
ISACA	Information Systems Control and Audit Association
ITIL	Information Technology Infrastructure Library
SOX	Sarbanes Oxley Act
PCI	Payment Card Industry
DSS	Digital Security Standards
SPEM	Software and Systems Engineering Model
CISO	Chief Information Security Officer
POS	Point of sale
AR	Advance Retail
CSO	Customer Sales Order

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Chapter 1

Introduction

1.0 BACKGROUND

Creating value for businesses through process improvement has become a trend throughout the business world. Information technology, which is central to all businesses, has processes integrated through all facets of the business. Looking at the retail industry these facets include, but are not limited to finance, marketing, ecommerce, shop level functions, human resources and payroll, buying departments and so on. Another area of concern is information security which can also be made more effective as information security processes evolve towards best practices. While best practices are highly recommended, there are instances when a best practice may not necessarily suit the needs of a specific business. In other cases, it may be due to lack of resources such as time and money as well as human resources. In some cases, the costs of best practices outweigh the benefits, and this is the reason some businesses don't invest in business improvement initiatives. The purpose of this research is to evaluate at how IT Audits can add value to any business regardless of their current disposition

Information Technology Audit is vital to businesses that intend to improve their overall value by making optimal use of its IT resources. IT Audit by definition assesses and evaluates the IT resources, policies and the operations of a business. It is a means through which those in governance are able to determine whether the controls in place are able to protect IT assets from misuse, maintain data integrity and be assured that the IT goals are aligned with the business goals. When looking at data, apart from integrity, data needs to be reliable, complete and secure from any tampering. Therefore, the controls and processes in place when collecting data requires the sort of assurance that can be provided by auditing. Another area of importance is compliance with the regulations for Information Technology as it is also a value adding activity. The US Sarbanes Oxley Act is one such regulation that has global recognition and acceptance as it supports information security and also the many ISO standardisations. Some benefits of compliance are better credibility, reduction in costs, lower business impact, improved processes and controls, elimination of double handling and the ability to manage multiple frameworks

(Dzuranin & Malaescu, The Current State and Future Direction of IT Audit: Challenges and Opportunities, 2016).

Numerous literature sources have been reviewed in this research and as a result of which it has become clear that IT Audits are in the best interest of businesses. IT Audits are about control in the IT environment and consequently this research will use two IT control frameworks. The first one is COBIT 5 which is a control framework for IT governance and management in businesses. The other one is ITIL which is a set of best practices that focuses on IT service delivery with the business needs. Chapter 2 also highlights that there are many audit tools available that help determine the effectiveness and efficiency of IT processes. The tool that this research focuses on is the Capability Maturity Model Interface from COBIT 5. CMMI assesses the maturity level of existing processes and then helps to determine ways for improving the maturity level so as to make optimum use of IT resources. An in depth discussion is carried out in chapter 2 about this optimisation tool. To add greater value, the assessment data is collected from three IT processes carried out in a retail environment. The purpose of the fieldwork is to perform an assessment of the maturity level of these processes and record suggestions from participants on how the maturity level could be further optimized. These findings will be compared to conclusions from the literature reviewed and industry best practices to answer the research question:

What value can COBIT 5 add to ITIL adoption?

1.1 MOTIVATION

In my current role in IT operations as a Service Desk Analyst in a retail business which employs over 5000 people, I have gained exposure to numerous IT processes. Observing and performing these processes has raised my curiosity to see if there are ways in which these processes could be made faster. For someone who follows a customer centric approach in service delivery, I like to be efficient without losing out on the quality of work. Therefore, my inclination for process improvement is the driving reason for pursuing this research. However, work past experience has trained me in learning to look at all processes as part of a larger system. Thus, simply making suggestions is not sufficient. Rather, the whole system needs to be thoroughly understood to see if a change in a process will have any impact on the processes or even the business system as whole. The different systems employed are diverse and there are several areas in the retail environment that have great potential for research.

There are 3 processes which are of interest for the purpose of this research: Security Access Request, Campaign Loading and End of Day. The reason for selecting these 3 process from the hundreds of IT processes in the business is that these are particularly critical in business operations. The current steps in the process are derived from ITIL best practices. Security access requests determine who can get access to what applications and when as well as who authorises it. Because the business continues to try to improve sales by running marketing campaigns, the campaign loading process has been selected. The End of Day process is run at the end of each day in order to finalise transactions and process banking. The process is performed daily at nearly 300 branches and thus has been selected for this process due to its significance in daily operations.

The first potential is to gain a better understanding of IT Governance which is a means of monitoring and measuring performance, and a means to make the best use of investment in IT resources. This research discusses this area in detail and the role that IT Audit plays in supporting it. The second area of interest is the management of IT resources in relation to service delivery which brings about a better understanding of ITIL 3. Information security is another area in which I am strongly interested. The retail industry has inherent potential risks of losing customer information as well as confidential business information. Loss of such information leads to a loss of any competitive edge that they may have gained. With information security, there are naturally processes and tools in place, but it is also important to understand how these tools work and the ways the use of these tools could be optimized. In addition, it is also necessary for users of information technology to understand what information security is and the role they could play in supporting it. For users, information security can be supported by anything from password resets, to the appropriate service levels, and to the ability to proactively identify phishing emails. Moreover, business improvement through improvement in the use of IT resources is paramount since IT is central to all business processes. In the past, businesses with IT resources were considered to have a competitive advantage in the market but now the circumstances have changed as IT is a prerequisite to participation, and competitive advantage in the market. To gain an advantage as such, businesses now need to be able to follow best practices and commit to continuous improvement by enhancing the maturity of the IT processes that they follow. Best IT control is through IT Audits and this relationship is the primary motivation for this paper.

1.2 AIMS OF THE THESIS

The primary aim of this thesis is to determine whether the application of a control framework such as COBIT 5 will have any extra value in adding impact for retail businesses that follow the ITIL framework for best practices in the industry. This aim will be achieved by working through a set of objectives. One objective is to get a thorough understanding of control frameworks and how they support process improvement. Much of this information can come through a comprehensive literature review. The next objective is to identify a control framework that can be used to effect in a practical sense in a workplace. Also the objective is to identify an assessment tool from within the framework and use it to assess processes within a retail business which uses a best practice framework. After an assessment, the next objective is to obtain recommendations for improvements that are suggested by the researcher and the research participants. An analysis of the research findings will help answer the main research question which asks whether the application of a control framework will have any impact on a retail business and whether the specific control framework, COBIT 5, will create value for a business that currently has a best practice approach to service delivery through the use of ITIL. To do this, a content analysis is the most suitable way of drawing conclusions from qualitative data gathered through unstructured interviews. As a result of the research, the participants get to learn about an IT Audit tool which in this case is the Capability Maturity Model Interface, and the primary researcher can gain an in depth knowledge of improvement of IT processes, IT governance and process improvement as a result of IT Audits. The ultimate aim of the thesis then is to contribute theory based knowledge to improve business practices and also to inform practice where others can read this thesis and learn from it.

1.3 THESIS STRUCTURE

The thesis consists of 6 chapters which are the Introduction, the Literature Review, the Methodology, the Research and Findings, the Discussion of Findings and the Conclusion. Chapter 1 introduces the readers to the research area with a brief background to the specific area of research. IT Audit is defined and the role that it plays in modern business environments, particularly the retail sector, described. In addition, the motivation behind this research is identified and discussed.

Chapter 2 serves the primary purpose of defining the key concepts for research and elaborates a comprehensive literature review. The key concepts that are defined

include control frameworks, IT governance and management, information security, audit, standards and risk management. It also discusses the two frameworks that are key to this research: COBIT 5 and ITIL V3. COBIT 5 is defined and described with regard to its benefits through application and the implications of implementing this control framework. In addition, the Capability Maturity Model Interface from COBIT 5 is also discussed as it plays a key role in data the collection reported in Chapter 4. ITIL V3 is also discussed together with examples of its application complimented by the benefits and challenges associated. Chapter 2 concludes with the highlights from the literature review and identification of the key area for research, that of capability maturity, which forms the problem context for the research methodology in Chapter 3.

Chapter 3 defines the requirements for data collection and analysis. The three IT processes in the retail sector are identified and the metrics for evaluation specified. After obtaining the necessary ethics approval from the AUT Ethics Committee (refer to appendix 1 for the authorisation letter), an advertisement was placed at a retail business to recruit participants. The methods of data collection are identified with supporting reason. In this case the method is observation of three IT processes followed by followed by unstructured interviews. The type of data required for this research is defined and how this data will be recorded is described. The data analysis is also elaborated on the forecasted outcome is indicated.

Chapter 4 is a presentation of the data collection together with a discussion of the processes that were observed. Data from observations and the unstructured interviews is reported in summary form and the full documents may be found in the appendices at the conclusion to the thesis. The maturity rating that the research participants gave for each of the processes are also reported. The reasons for their ratings are discussed as well as their suggestions for improvement. The potential implications of implementing their recommendations are also evaluated.

Chapter 5 is a discussion of the key findings from Chapter 4 and answers the sub-questions for this research. The hypothesis for this research is also tested at this stage and a discussion is carried out on the research findings which leads to answering the main research question. The assessment of each IT process also takes place here together with the flaws identified by the participants and how each of these processes could be improved. Chapter 5 is ultimately a critical analysis of the findings from literature review matched against research findings in chapter 4. The chapter

concludes with recommendations to process improvements for optimization of IT resources.

The thesis is concluded in Chapter 6. Here a summary of the key research findings is presented. It also highlights the challenges while conducting this research as well as specific limitations that may have affected the quality of the data collected. Recommendations are then made on how these limitations could be overcome in future research works as well as suggestions on how IT Audits could be improved in the retail sector. The reference section also includes references which follow the 6th version of APA. In addition, there is an appendices section which includes the ethics approval and data from the fieldwork. These are the COBIT 5 assessment tool results, checklist of tasks observed in a process and the appropriate ethics records.

1.4 CONCLUSION

The purpose of this chapter was to introduce the reader to the research topic and how the proceeding chapters are structured in order to answer the research question. The chapter has also provided background on IT Audits and how conducting such audits can help businesses improve the performance of their IT processes as well as the overall performance of the business. IT acts as the nervous system of businesses. All departments within a business are reliant on IT to facilitate effective performance of the tasks at hand.

The next chapter is a systematic literature review which carries a comprehensive discussion on IT Audits. In addition, the core principles for IT audit are also defined. This includes defining ITIL and COBIT 5 which are the two control frameworks of interest in this study. In addition, other terms such as IT risk, IT management and IT governance are also defined to provide a broader perspective on the role that IT Audits play within businesses. Based on the analysis of chapter 2 issues and problems, a methodology for data collection is defined in chapter 3.

Chapter 2

Literature Review

2.0 INTRODUCTION

The purpose of this chapter is to do a literature review that can cover the scope of the research topic. The central concern is to answer the research question – Assessing Security Control Framework Impact in the Retail Sector – What Value Can COBIT 5 Add to ITIL adoption? The importance of security control frameworks is established in the role that they play for enforcing best practices in retail businesses. In essence these are elements that help assess and manage IT risks within retail businesses. The two IT frameworks identified for this research are COBIT 5 and ITIL V3. Therefore, the objective of this chapter is to gain through knowledge of these IT frameworks by reviewing literature and also to look at some of the other frameworks that are used by various businesses. This literature review will mainly focus on cases where these frameworks were implemented and how it was done so that readers also see what is involved in the implementation of control frameworks. In addition, a comprehensive understanding of the benefits and challenges associated with these frameworks will be developed. The issues and problems in key areas for each search can be identified so that a scope is set for answering the main research question.

This chapter comprises of 6 sections. The first section (2.1) defines what a control framework is and gives some examples. Section 2.2 is a detailed discussion of the security concerns within the retail sector. The risks in this environment are identified and risk assessment is discussed. Section 2.3 starts off with introducing the two frameworks of interest, and then a comprehensive discussion is carried out on COBIT 5 and ITIL V3. These frameworks are thoroughly described and backed by several academic articles which also identify the benefits as well as drawbacks and challenges faced when implementing these frameworks. The next section (2.4) looks at how Audit works in the IT environment and the standards that are followed when performing IT Audits. The standard issuing authorities are also identified. It also reviews how risks are managed after IT Audits, as well as risk management techniques. Section 2.5 is a review of issues that were faced while writing the literature review. The issues will mainly focus on the availability or lack of relevant works to support an effective review. The final section (2.6) looks at drawing conclusions from

the research and whether this literature research answered the main research question regarding the ability of COBIT 5 to add further value to businesses adopting ITIL V3 as their primary IT service delivery framework. The limitations of the literature review is also discussed as well as how such a review could be made more effective.

2.1 CONTROL FRAMEWORKS

A control framework is an analytical tool used to influence behaviour with the intention of risk management and value adding. According to technopedia (2017), “a control framework is a set of controls used to protect data within the IT infrastructure of a business. It acts as a comprehensive security protocol that protects against fraud or theft from outsiders and other criminal elements”. Generally, control frameworks are different for different businesses but there are some key characteristics that remain the same. These include risk assessment, identification of critical events, and development of response plans. Control frameworks also include the requirement to comply with government legislations and industry guidelines. The purpose of a control framework, once implemented, is to mitigate risks and to promote compliance. This is done by monitoring, reviewing and verification of IT processes and the setup of the IT infrastructure. Ultimately it creates value for the business. It does this by setting a goal for IT, monitoring the performance of activities required to achieve that goal and making necessary changes if the goals are not achieved (Moshtari & Ghaemi, 2016).

Control in its simple form refers to influencing the way an individual or a group behaves with the intention of achieving prescribed objectives. A framework by definition is a multi-layered structure that defines course of action. Therefore, a control framework in IT is a layered structure that controls the way that IT professionals behave in any given environment or situation. It can be used to categorise mechanisms such as who does what and how they do it (Cram, Brohman, & Gallupe, 2016). For example, in the presence of a threat people would refer to the control framework to seek guidance on what action to take and to choose between alternative actions (Chaxel, 2016). From the perspective of IT, control frameworks are basically about internal controls that help manage risks. Business usage of ERP systems has greatly increased which has led to increase in associated risks, which in turn has led to an increment in control and security procedures (Chang, Yen, Chang, & Jan, 2013). For information security implementation, controls are put in place to protect information from unauthorised access.

One of the most common frameworks used by businesses is COSO (Committee of Sponsoring Organizations of the Treadway Commission, 1996). This framework is designed such that businesses can use securely control financial processes and to promote efficiency. The main components of COSO are the Internal control environment, objective setting, event identification, risk assessment, event identification, risk assessment, risk response, control activities, information and communication and monitoring. According to Chang (2013), the report on control frameworks released by COSO in 1992 failed in terms of listing supplementary requirements for the implementation and assessment of IT controls.

2.2 SECURITY CONCERNS

Security concern refers to the risk that attackers may gain unauthorised access to sensitive and confidential information. Retailers always have an ongoing concern about the security of their information and that of their customers. Ensuring the security of customer data is now a part of strategic business policy for retailers in the US (Hemphill & Longstreet, 2016). All IT controls are put in place so that information is not accessed, changed, used or disclosed without authorisation. This is the major concern in any industry including the retail sector. Attacks on information are generally to steal confidential information, carry out financial fraud, render web servers useless and corruption of operational data (Chaxel, 2016). If an attack is successful, the accuracy and reliability of information generated from an information system is compromised. Recently, attackers have targeted point-of-sale devices, systems and vendors. More recently, it has been whaling attacks that have been a matter of great concern in New Zealand where a series of emails were sent to Chief Financial Officers making requests for payments which seemed authentic.

Online retail has its own set of risks. From the customers' perspective the areas of concern are financial, service quality and psychological. The psychological concern is related to information security whereby customers may lose personal information as a result of security breaches when making online purchases (Davari, Iyer, & Rokonuzzaman, 2016). A lot of local retailers have launched online shopping services and to retain patronage they need to provide assurance on information security. This assurance is provided by audit and assessment of a number of factors. The factors are determined by the critical information that is in action when using online services. These include customer personal details such as full legal name, date of birth, address,

contact number and credit card or bank account details. The sensitive elements of information in the wrong hands can result in significant losses for both the businesses and the customers.

Dhillon and others (2016) have determined a comprehensive list of information security concerns. They have identified regulatory compliance, outsourcing of information technology, the competency of outsourcing vendors, trusting a vendor not abuse a client's information and that the vendor complies with the client's outsourcing policies. They have also identified the information security credibility of the vendors, inability to review and redevelop information security procedures, inability to change information security requirements, audit of outsourced IT operations, the financial viability of information technology outsourcing.

IT concerns in the retail sector are numerous, and the main vulnerabilities of cyber-attacks are employee and associated with customer records. In a survey carried out by PWC (The Global State of Information Security, 2016) most respondents attributed security risks to the following groups: current employees, former employees, current service providers/consultants/contractors, hackers and organized crime. An attack could be in the form of an intruder gaining unofficial access, the intruder destroying, corrupting or altering data, fake messages from the user's system and implementing malicious procedures causing a network to fail (Bamrara, 2015). With the use of mobile EFTPOS technology, risks have become greater and have the potential to cause greater damage when they materialise.

In an effort to better manage cyber risks businesses are expected to include a cyber risk assessment in their risk management procedures, the IT budget is adjusted to match the cyber risk assessment, employee training to educate them on security threats and to develop a response plan for security incidents (Golden, Tyler, & Eucker, 2016). Business tend to face disruptions in IT services on a regular basis. Thus, it becomes necessary for them to develop a business continuity plan to handle any incidents or situations that arise. Business continuity management is one of the ways this can be done. It includes business impact analysis and risk assessment. Using these tools a business can identify the critical functions necessary for service delivery and the resources needed to resume business after an incident has occurred (Torabi, Giahi, & Sahebjamnia, 2016). Risk assessment has also been defined by Torabi (2016) and others, as the process of identifying risks, analysing those risks and evaluation. It involves using a logical way of using the available information to determine what the

potential risks are and their potential effects on business operations. A similar perceptions of risk assessment is that it is a process of risk identification and analysis as well as the prioritisation of information security risks so as to determine the extent to which these threats could adversely affect the business (Rabai & Jouini, 2016). The usual technological risks include failure of system hardware, computer viruses, cyber-attacks, hacking and cracking, disruptions in Internet services, loss of customer data and software failure. The goal here is to thoroughly understand the risk and its impact, and to prepare an appropriate response plan. Some known risk assessment techniques are Failure Mode and Effect Analysis and Fault Tree Analysis (Rabai & Jouini, 2016). With businesses that employ cloud computing, they have their own set of risks to deal with as it brings about new ways to exploit information systems. Some risk assessment models for cloud computing systems are SecAgreement, Mean Failure Cost and Mean Failure Cost Extension Models (Rabai & Jouini, 2016). The purpose of these models is to quantify the potential threats to cloud computing. These including enhancing the Service Level Agreements to treat risks, the impact on stakeholders when security is violated, the analysis of vulnerability of systems, decision making techniques in response to an incident and catering for any other dimensions of security threats.

IT risk assessment is a critical part of businesses (Aliquo Jr & Fu, 2014). To not have a response plan ready to deal with security breaches is an unacceptable risk adoption. Simply having a response plan is not sufficient. Situations and incidents change and evolve over time as do the various types of security threats. As such, response methods also need to improve, to more effectively and efficiently to manage the current threats. It is quite normal for businesses to have performed risk assessments at intervals of several years but these need to be updated for the current business state (Pasman, Rogers, & Mannan, 2017). Pasman and others (2017) have identified the six steps required in risk assessment as; hazard identification, quantification of sequence, quantification of probability of events, quantified risk, risk reduction and risk analysis. Hazards are identified through the analysis of databanks, checklists and indexes. The quantification of consequence involves an analysis of effect as well resulting damages. The quantification of probability of events is done through assessing reliability and fault tree and event tree analysis. The risk itself is quantified through risk evaluation, assessment of the uncertainty and comparison of risk. Finally, risk is reduced through the means of safety management systems that are developed, barriers that mitigate risks and a stringent strategic plan for emergencies.

Apart from information security risk assessments, business requirements and legal expectation also change which in turn affects the IT processes that are carried out within a business. Businesses need to improve their IT processes on an on-going basis. This is normally done by identifying business strengths, weaknesses and by assessment of the business's risk appetite whereby changes are made to existing processes to improve service delivery. It essentially means adapting to best practices in order to promote continuous improvement in process effectiveness and efficiency (Aliquo Jr & Fu, 2014). DuPont is one of the businesses that was successfully able to improve its IT process management, governance and compliance using the COBIT 5 performance assessment model (PAM) (Inaba, 2016). This is an indication of the usefulness of using COBIT 5. The following sections discuss COBIT 5 in greater detail.

2.3 COBIT 5 AND ITIL 3

This section reviews the two main frameworks that are a focus of this research. The first one is COBIT 5 which is a leading control framework used for governance and the management of business information technology. It is used by managers who are in charge of performance and risk management to improve the performance of the business by reducing risk and adding value (ISACA, 2017). The next section looks at defining and describing COBIT 5. The other framework that is focused on is ITIL V3, which is a collection of best practices for managing information technology services. It essentially helps businesses better manage their IT resources (AXELOS, 2017). Section 2.3.2 looks in detail at what ITIL V3 is and the role it plays in promoting best practices.

2.3.1 COBIT 5

COBIT 5 is a framework created by ISACA that is used for the purpose of IT governance and management of business IT resources. The term IT governance is derived from Corporate Governance which came into focus as a result of some major financial scandals such as Enron and Arthur Anderson (Spears, 2009). Governance refers to determining policies and implementing them and monitoring performance on an ongoing basis. Therefore, IT Governance is about the processes of making decisions on IT investment and monitoring the investment to ensure that the business gets the best possible outcome from it and at the same time managing risks (Alreemy,

Chang, Walters, & Wills, 2016). Governance processes are concerned with optimizing risks and resources and realising benefits from them. As a result of IT governance businesses can achieve the optimum output from their IT assets which in turn supports the strategic business goals, thus giving the businesses a competitive edge.

On the other hand, Information Technology management is the process of overseeing IT operations and related resources within businesses. It ensures that IT resources are used efficiently by employees and creates value for the business. This is done by promoting best practices. One of the ways this is done is by performance appraisal by determining whether technology has led to improved performance (Aro-Gordon, 2016). In the current environment of advanced technology, IT is a critical success factor and it is prudent to adopt new technology to innovate employee performance. Fundamentally, it acts as a tool for managers to create a link between the technical, risk and control aspects of the business. COBIT promotes quality, control and the integrity of information systems. It also creates a distinction between management and those in charge of governance. It helps IT professionals meet their responsibilities whilst delivering value to the business, and it helps businesses create the best value from IT by maintaining a balance between realising benefits and managing risks and resources. It enables the management and government of IT for the overall business in a holistic manner while upholding the IT-related interests of the stakeholders, both internal and external. The principles and enablers in COBIT 5 are generic and therefore useful for businesses of all sizes and types such as commercial, not-for-profit and the public sector.

There are a number of fundamental business problems that COBIT 5 aims to solve. The first is organization structure that works efficiently and effectively enough to promote IT Governance. Cost control is another area of concern for IT governance as well as management of IT processes. Next is the ability to correctly report on governance and management processes. Another one is the ability to monitor and evaluate business goals and aligning IT goals with that of the business. Moreover, the ability to manage risks of the business is also of importance (Atkinson, 2015).

COBIT has various components: framework, control objectives, process descriptions, maturity models and management guidelines. As a framework, it organises the objectives of IT Governance and brings about best practices in regards to IT processes. Process description comprises of planning, building, running and monitoring of the IT processes. The control objectives are those that management

considers effective for IT business control. With maturity models the management can access the maturity and capability of processes while addressing the gaps. The management guidelines assist in assigning responsibilities, performance evaluation, agreed upon objectives and show improved interrelationships with other IT processes.

The goal of the COBIT frameworks is to provide a common language for business executives to communicate with each other about IT-related goals, objectives and results. COBIT 5 is also designed to help enterprises to provide assurance on the accuracy of the information for decision makers. This includes the reliability and relevance of information. Another purpose is to assist the business in achieving its strategic goals by effectively using Information Technology. Moreover, it allows businesses to maintain operational excellence by making optimum use of information technology. It also provides for the management of IT related risks and keeping risks at an acceptable level. The framework promotes the best use of IT resources while keeping in check the costs associated with Information Technology. Finally, COBIT encourages businesses to comply with relevant laws and regulations.

The COBIT frameworks have become an industry standard for IT management and governance. COBIT was initially an acronym for "Control Objectives for Information and Related Technology," but with COBIT 5 the spelled-out version was discontinued. The changes between COBIT 4.1 and COBIT 5 include more emphasis on creating business value. The COBIT 5 framework, which was released in 2012, is based on five key principles (Radhakrishnan, 2015):

- Meeting stakeholder needs
- Covering the enterprise end-to-end
- Applying a single integrated framework
- Enabling a holistic approach
- Separating governance from management

COBIT 5 also combines the COBIT frameworks with others developed by ISACA, such as Val IT and Risk IT, and resources from the Information Technology Infrastructure Library and related standards from the International Organisation for Standardisation.

The stakeholders are namely shareholders, customers, employees, regulatory agencies and social communities. They all expect some sort of value to be generated by IT. The goals of the business, cascade from the stakeholder needs to enabler goals. The enablers are factors that can effectively suggest that something will work, in this

case governance and management of IT. According to Katsumi (2014) Japanese businesses are conservative and reluctant to change. However, there is strong motivation to improve the style of governance. By this they mean that it is about improving processes rather than empowerment of any particular role in the organisation. In Japan, businesses use Kaizen and TQM to improve customer satisfaction and protecting confidential information. Because COBIT 5 integrates many process, improvement, and quality initiatives; it is a useful tool. It clearly highlights effective management and governance procedures in the IT environment. In addition, it provides a models and best practice procedures to improve and measure quality and create value. In an effort to promote growth, an organization in Mexico City adopted the Holistic approach, end to end vision and the 7 enablers (Tapia, 2015). The seven enablers being:

- Principles, Policies and frameworks
- Processes
- Organisation structures
- Culture, ethics and behaviour
- Information
- Services, Infrastructures and Applications
- People, Skills and Competencies.

In essence, this organisation combined COBIT 5 with its strategic planning exercise. As a result of this, less time was spent with executives in terms of planning. It paved the way for a directed, controlled and efficient operations by the executive group. They then had knowledge of a holistic and end-to-end approach and a stronger focus on business goals. In Malaysia, where floods are quite frequent, COBIT was considered in regards to managing and controlling Information technology. Othman et al. (2014) assessed the disaster management phases; Prediction, Warning. Emergency relief, Rehabilitation and Reconstruction. It was determined that COBIT is suitable for the processes of the agencies of Flood Management, providing value by balancing benefits, risks and resources, effective relief and impact reduction (Othman, Ahmad, Suliman, Arshad, & Maidin, 2014).

When a business is underway with the decision to implement COBIT 5, they can sometimes be overwhelmed by the amount of information that is included in COBIT 5 (Atkinson, 2015). This is where time is taken to break the implementation down into smaller processes and to make it more manageable. Then they can proceed to the

COBIT 5 enabling processes and identify any process gaps that exist. When the implementation progresses, various process owners from different parts of the organisation need to collaborate to bridge the gaps in best practice.

These lead to better practices and outcomes when IT enabled initiatives take place. Chatterji (2016) suggests that a lot of such initiatives are not effective and can be classed as unsuccessful. According to him, business benefits realisation (BBR) can be effectively improved with the use of COBIT 5 as this is something very important to those in charge of governance. This leads to the need to for benefits realisation management.

The story of Vasa, a sunken warship, is used as an illustration of how useful the enablers of COBIT 5 are by Brown (2014). The point of focus is that the procedure used in designing and building, may not have been the most efficient one. For instance, when the idea to build the said boat was conceived it may have been prudent to consider factors such as the interests of the owners of the project, their risk appetite and the controls in place to manage those risks. Those assigned the task of building needed to define their processes. It is vital to understand whether they had tried and tested methods, the best practice of that time or simply doing whatever seemed to work with no consideration for optimisation. This would have been just starters for a COBIT 5 approach. An important benefit derived from COBIT is improved information security which is discussed in the next section 2.3.1.1.

2.3.1.1 COBIT 5 for Information Security

Information security is the practice of preventing unauthorized access to sensitive and confidential information. According to the references from ISACA, information security is needed to maintain the trust of stakeholders. Value adding applies when the essence of information security is used to manage business risks and thus, a competitive advantage (ISACA, 2012). The threats to information security are constant and ever changing. In order to gain the trust of stakeholders, first determine what it is that they value. Stakeholder drivers include the environment and technology as well as optimum return on investment. Stakeholders essentially need to realise the benefits from the operations of the business, efficient use of resources while optimising risk management. These then cascade down to the business goals, which point to IT goals, which paves the way to enabler goals.

Information Technology in the retail environment has many risks that need to be managed. These can be anything from access control to protection of customer information. This research looks at the IT Governance Framework of COBIT 5 (Control Objectives for Information and Information and Information Related Technologies) and how it can be used to take effective control of IT risks. Currently, most industries are using ITIL (Information Technology Infrastructure Library) to manage IT risk at the operational level. COBIT 5 is a higher level control framework that provides management risk controls and at the same time can be applied with the ITIL framework. The purpose of this research is to study the use of COBIT 5 with ITIL and to evaluate what business value may be added. Information is to be gained from interviews, observations, and document analysis in the retail sector. The retail sector has received a lot of media attention due to the breaches in protecting customer data, hacking of databases, and the electronic cheating of security systems. The types of data in a retail sector include credit card information, personal information, financial information, planning information and most of all transaction information. The problem has led to much research in determining ways to improve security through cyber liability insurance coverage, self-regulation and market force frameworks (Hemphill & Longstreet, 2016).

COBIT 5 is the most recent version of a framework that allows those in charge of Governance to take effective control of the IT structure in an organization to manage risks, technical issues and business exposure (ISACA, 2016). COBIT 5 is particularly useful in performing a self-assessment on shared services and IT management (Jorg, 2015). This is because the guidance provided is detailed and comprehensive enough to be able to span the entire business. According to Jorg (2015), using COBIT 5 for self-assessment can bring about improvements such as increased transparency in the IT processes, involvement of the business side in making decisions, proving the benefits of being in control of IT, clarity on risks and the level of risks the business is prepared to withstand, and team alignment between IT and the business as a whole. COBIT 5 remains relevant when other frameworks are also used to manage risks. For example ITIL is widely used to manage operational risks, and Prince2 for project management. COBIT 5 however is able to provide a meta-framework in which all these other operational layer frameworks can operate (Tan & Carter-Steel, 2005). Inaba (2016) adds that the COBIT 5 framework is an excellent way to create value for customers by combining the framework with the service

delivery standards (such as ITIL v3). Such conjectures lead to research questions and the possibility of looking at how COBIT 5 can work with other control frameworks.

The COBIT 5 principles have been used to implement the information security requirements of ISO 27001; meeting the stakeholder needs, covering the enterprise end to end, applying a single integrated framework, enabling a holistic approach and separating governance from management (Onifade, 2015). Onifade (2015) has also identified the practical steps to leverage COBIT 5. These are training and awareness, gap assessment, implementation design and program management. The paper strongly advocated COBIT 5 as a means to integrate multiple IT management systems and provides a way of evaluating the relationship (Efe, 2016).

Consequently, this research is to focus on the value that COBIT 5 can add to a business by acting as the integrating control framework for other operational level control frameworks. The best way to do this is to first identify from literature what COBIT 5 has to offer, how it may be applied to different control frameworks, and what metrics are required to measure the potential impacts. The concept of risk in the retail sector environment also has to be explored. The study is to specifically look at security risk but a wider scoping of general IT risks will also be noted.

There are seven classes of goals that enable information security (ISACA, 2012). First are the processes. These are prescribed procedures that are followed to attain IT objectives. The level of control applied in these processes has to be assessed. Second is the organization structure which manages decision making. It must be determined who has the authority to do what. The Third relates to the culture, ethics and behaviour. Ethics can be of many types. Sometimes individuals make a decision that is morally ethical but not according to the code of conduct. The fourth enabler is information that is produced and used by the business. Control of access to this information is absolutely necessary. Number five is, the services infrastructure and applications which gives a business the ability to process information electronically. The Sixth relates to people, skills and their level of competency. The Seventh and central is the enabler with the description of principles, policies and frameworks. These are the means through which expected professional behaviour is applied to day to day operations.

ISACA, in association with other global information security organisations has developed twelve information security principles. These principles are clustered in groups of 3 tasks. The first involves effectively supporting the business by integrating

information security into primary business activities. The next principle works to ensure that value is delivered to stakeholders as a result of applying information security as well as meeting the business needs. A principle here also ensures that statutory compliance requirements are met. Another principle ensures that effective reporting takes place on the performance of information security measures. Yet another principle requires the assessment of existing and potential threats and how timeliness of response is important to mitigating such risks. The last principle is: the task promotes the need for continuous improvement in information security.

The second task is to defend the business on the basis of four information security principles. The first is to adopt a risk-based approach so that risks are dealt with regularity and effectively. Sensitive and confidential information must have an appropriate level of protection. As protection cannot be applied universally within the business, the focus of information security should be on critical business applications. Next, systems need to be developed in secure manner as well as maintaining cost effectiveness, whilst still being reliable.

The third task is to promote ethical behaviour by acting professionally, adhering to relevant code of ethics. It is also important to create a culture within businesses where information security is supported by all team members. This can be impressed onto them by explaining the impact of lax attitude towards information security. Examples can be drawn from the recent whaling attacks on retail businesses and the ongoing spam emails that require users to open an enclosed link. Most businesses do advise their employees to exercise caution when opening emails from unknown sources. These threats amongst others are managed through the use of information security policies.

The purpose of policies is to provide comprehensive guidance on applying security principles in practice. ISACA provides a list of policies as examples. These are information security policy, access control policy, personnel information security policy, physical and environmental security policy, incidental management policy, business continuity and disaster recovery policy, asset management policy, rules of behaviour, information systems acquisition, software development and maintenance policy, vendor management policy, communications and operation management policy, compliance policy and risk management policy (ISACA, 2012). The list may cover many areas but not necessarily all.

Once a decision is made to design a policy framework, the IT policy maker needs to ensure that it is aligned with the objectives of the business, its strategic goals and overall risk appetite. Here it is important for the policy maker to seriously consider using a life cycle approach.

2.3.1.3 Seven Phases of Implementation Life Cycle

The seven phased life cycle of COBIT 5 is also multi-layered. There are 3 layers to be addressed. The first phase determines the triggers for the need to start the program. An example could be a business involved in ecommerce. They use online payment systems and telephone payments thus dealing with critical customer information, including credit cards. Such a situation also brings about the need to review the potential threats in this area and consequently initiate the programme of creating and implementing new policies.

Phase 2 is about defining the areas of opportunity. A team of highly skilled IT Security professionals is formed. Their role at this stage involves carrying out an assessment of the current state of the security environment. Once they have identified the potential issues, they can proceed to phase 3. Phase 3 defines the plan to achieving the ideal security state. They identify the gaps between the current state and how the state should be. Potential solutions to existing problems are identified. Phase 4 identifies steps that need to be taken to improve the security environment. The plan is officially set and the players are identified. Phase 5 puts the plan in motion. The improvements are implemented and people get to use and operate under the new policies. Step 6 deals with determining whether the gaps were filled, meaning whether the process arrives at where we meant to. It is all about trying to realise benefits from the implementation of improvement procedures. The final steps in other processes, Step 7 involves review and evaluation. Assessments are made on whether the new processes are effective or not, whether the effectiveness is sustainable and if there is room for further improvements. This can be done using the Capability Maturity Model interface from COBIT 5.

2.3.1.4 COBIT 5 Capability Maturity Model Interface

The capability maturity model is a tool used to improve processes by first assessing existing processes and then assigning a maturity level to it and eventually determining factors that could lead to improvements. These assessments also help determine or

define what the future level of maturity should be for these processes. CMMI acts as a reference model for organizations looking to improve their performance through the use of best practices (Pane & Sarno, 2015). For the COBIT Framework, the model has evolved from COBIT 4.1 to COBIT 5. The structure of the framework has been modified in COBIT 5 to give more importance to processes (Pasquini, 2013). In order to achieve a higher level of maturity a road map needs to be developed whereby COBIT 5 is used to set a target level of maturity, determine the steps needed to reach the targeted maturity level, determine a timeline and define any interdependencies (Atkinson, 2015). Pane and Sarno (2015) used CMMI as a reference model for an object oriented software development process. Using this, they were able to create a checklist to verify and validate the object oriented approach for the optimization of results.

There are several reasons that businesses find CMMI desirable for business improvement. It focuses on areas where problems are more frequent which in turn overcomes the defects that affect effectiveness and efficiency. CMMI also guides users so that they are able to understand the maturity level of processes. In addition, CMMI is able to assess the process strength of a business (Garceau, Pointer, & Taroff, 2015). There are five levels of maturity in CMMI: Performed, Managed, Established, Predictable and Optimizing.

The capability maturity model was applied in evaluating the attraction of tourism websites in China (Zhong, Leung, Law, Wu, & Shao, 2013). The intention of this was to improve the functions of the websites as well as how users interacted with those websites. The key performance areas in relation to capability maturity for the websites were identified to be accessibility, usability, functionality, interaction, commerce and marketing. Each of these areas were assessed for their maturity level and determined how they could be improved so as to improve the overall maturity level of the attractiveness of the tourism websites.

An area of importance for retailers is Business Intelligence which helps businesses remain competitive in the market through analysis of business raw data. It serves the purpose of allowing business managers to make intelligent and effective business. Tavallaei (2015) and others carried out a study to determine the maturity of business intelligence in the banking industry. Once the maturity level was determined, focus was shifted to the process of collecting and storing data. After assessing this, it

became easier to recommend tools and approaches that could be used to the maturity of business intelligence.

Maturity of processes eventually leads to a better organized and systematic way of conducting business. Assessing the maturity enables interested parties to establish the strengths of the business as well as areas that require improvement. This is done by creating measures for auditing and benchmarking, assessment of performance against goals and a clear understanding of business strengths, weakness and areas of opportunity (Proenca & Borbinha, 2016).

IT risks management can be effectively optimized using a capability maturity model. Carcary (2013) carried out a study examining the IT capability of an organization and analysed it in relation to managing IT risks. Carcary (2013) agrees with other authors in terms of improving processes to reduce risks such as data leakage, asset theft and damage to reputation of business by optimizing the value of IT investment. Maturity of risk management can be assessed by defining risk policies, establish the ownership of policies, integration of risk management in IT governance, identification of roles and responsibilities, support of senior management, assessment of effectiveness risk management processes, stakeholder training and dissemination of risk management policies and processes (Carcary, 2013). From this study, it was concluded that maturity models are highly relevant to business processes today and will definitely contribute to value creation.

The literature discussed are in support of improved maturity through the use of capability maturity models. The authors above have identified different types of business processes that can be improved as such. IT business process can include anything from performing a sale on a POS system and increasing the effectiveness of a website to effective risk management through the assessment of risk management processes and activities. CMMI from COBIT 5 is the primary focus for maturity assessment that will be performed during data collection and analysis. The maturity levels can improve ITIL V3 processes, which are a contemporary collection of best practices. However, before determining any possible improvements, an implementer first needs to understand what ITIL V3 is. The control framework is discussed in the following section 2.3.2.

2.3.2 ITIL Information Technology Infrastructure Library V3 (ITIL V3)

The following subsections review ITIL V3. Section 2.3.2.1 reviews the history of ITIL and how it has evolved over the different versions . The section that follows (section 2.3.2.2) identifies the benefits of ITIL to organisations that choose to adopt it. The section also looks at challenges faced when implementing ITIL as a best practice framework for service delivery.

2.3.2.1 History

ITIL (Information Technology Infrastructure Library) is a set of practices that focuses on aligning IT Services with the needs of the business. While not organisation specific, IT has processes, procedures, tasks and checklists which can be used to integrate IT goals with the business goals. It is used as a benchmark to plan, implement and assess compliance and performance. This implies that ITIL also provides a structure for IT Governance because it focuses on on-going measurement of process and the improvement of the quality of service provided to customers (Kabachinski, 2011). ITIL is now in its third version, known as ITIL V3 and consists of 5 main books (a further version called International came out during the time that this thesis was being written). These consist of: Service Strategy, Service Design, Service Transition, Service Operation and Continual Service Improvement. In a nutshell, ITIL is all about changing the IT processes so that it focusses on business goals and creates value. In essence, it changes the way a business utilises IT.

As the name suggests, ITIL is a library of service management standards for Information Technology and has been around since the late 1980s. It is seen as a collection of best practices for IT Service Management (Wahab & Soomro, 2015). It was introduced as a result of deteriorating level of IT services. While quite different from what ITIL is now, but it is still focused on service and delivery. In the 90s the public and private sectors in Europe adopted this framework and from there it spread all over the world. It is notable that in 2000, Microsoft developed the Microsoft Operations Framework using ITIL (About, 2016). It is also seen as an open guide for best practices that is adaptable by all businesses. It has a lifecycle approach to IT service delivery through efficient design and continuous improvement (Kabachinski, 2011).

With the release of ITIL Version 2 in 2000, the service and delivery ideologies were redeveloped to be more user friendly. By this time it had become the most widely used service management system. The most recent version of ITIL was released in 2007. This version created greater focus on seeing IT services in terms of life cycles. Thus the reason, most IT Specialist jobs expect experience in following IT tasks through to resolution. It also emphasised the importance of IT and business integration. ITIL Version 3 was last updated in 2011.

ITIL evolves as IT does, and it is viewed as a framework of best practices derived globally from public and private organizations (Ahmad & Shamsudin, 2013). Businesses are now moving towards ITIL implementation for two main reasons. The first is due to an increased focus on customer service and the other is because of recent added emphasis on IT Governance. In practice, ITIL has proved to have several benefits including cost savings, sound management of risks and overall improvement of IT operations.

ITIL is popular globally and has been accepted by many brands as the best approach to IT, particularly in the customer service environment. Some of these organisations are Microsoft, IBM and Disney. The basic essence of ITIL is to manage risks, promoting better customer experience and enabling value-adding changes in businesses. ITIL originally consisted of 30 volumes which were condensed into 7 books and now, finally into five books.

2.3.2.2 Benefits of ITIL

In modern day businesses it is found that ad hoc tasks act as barriers to completing planned work within acceptable timeframes. However, if ITIL is adopted in IT Service management, there are numerous benefits to be reaped. www.italtraining.com lists a range of these benefits. First, ITIL leads to a highly professional approach to service delivery which in turn leads to satisfied customers. Due to the fact that ITIL promotes best practice processes, it encourages overall improvement in IT services. Use of best practice processes means that best value can be derived from the use of IT resources. This not only supports the objective of managers but also improves return on investment which meets the objectives of those in charge of governance. With the use of ITIL, the coordination of services from third parties is also improved. Using the best practice processes is an advantage for the staff who can learn greater skills, can

be more productive and the staff are able to work smarter thus benefitting themselves as well as the business. By learning about ITIL, staff members better understand why processes are changed and what role they play in adapting to change. This leads to a reduction in training costs as well as other hidden costs. By understanding and acknowledging the contribution of staff, management is also able to retain quality staff. With the use of best practices, there is a greater understanding of IT expenditures as well as the value of assets. There is also increased ability to manage business risk and service disruption or failure, and develop the best response plans. Another benefit of best practices is that a high level of customer rapport is built and maintained as a result of delivering efficient services. ITIL brings about the elimination of redundant work such as double handling of tasks or performing unnecessary tasks. This also leads to better utilisation of resources. Finally, ITIL allows businesses to maintain performance indicators that act as benchmarks for IT and business strategies.

According to Iden and Iekebrokk (2015), the benefits of implementing ITIL can be both operational and strategic. One major benefit is that it allows for improvements in maturity levels in the alignment of IT goals and business goals. Other benefits include improvement in service delivery, predictability in infrastructure design, improved consultation processes and better negotiated service level agreements. The benefits identified are in agreement with what ITIL claims as its benefits. Another research proves similar benefits gained as a result of implementing ITIL. The improvements include improvements in the quality of service, standardization of service, resolution at first contact and so on (Marrone & Kolbe, 2011). Apart from improvement in service delivery, ITIL also provides a structure for IT governance (Kabachinski, 2011).

Many managers have found the implementation of ITIL quite challenging. In their review, Ahmad and Shamsudin (2013) have identified seventeen critical success factors for a successful implementation of ITIL. The first one is management support which implies that managers approve of the new policy and have sufficient resources for training. In addition, the initiate communication between the stakeholders of the business. This in turn means that all segments of the business are aware of ITIL as well as relevant training. Placing a high value on ITIL knowledge reduces resistance to change and they more easily adapt to new processes. With this, there is a need for collaboration amongst departments so as to optimise knowledge sharing means that transition to new processes between departments is much smoother. Another critical

success factor is ensuring that the tool selection process is appropriately defined and underutilization of tools is avoided. Also, the management needs to have a comprehensive plan to manage the change of processes. Moreover, there is a need to have structured procedures in place so that staff know how to deal with critical situations rather than simply reacting to events. Yet another factor is the use of consultants to transfer knowledge to permanent team members once the implementation process is completed. Overall, there needs to be a detailed implementation strategy in place which is well designed. Having a specific person in charge to promote and support ITIL is also very important. Staff members need to be involved during the entire implementation process as is the ability of the staff to easily adapt to change. If the staff members are highly competent the implementation process is smooth as well. Once the implementation is completed, the need to monitoring and evaluation remains so as promote continuous improvement. This involves the analysis of business requirements and goals as well as stakeholder involvement. To determine the viability of the implementation, it is prudent to carry out a feasibility study. The goal setting process is important as well as it helps businesses determine where in the business to start implementing ITIL. The adoption essentially establishes a good understanding of business needs though maturity frameworks like CMMI from COBIT 5. The final critical success factor identified is the need for continuous reporting and auditing to ensure a thorough analysis of ITIL implementation. Apart from Ahmad and Shamsudin (2013), there are others who agree that these identified critical success factors are important when implementing ITIL in situations (Ahmad, Amer, Qutaifan, & Alhilali, 2013).

Other authors such as Kabachinski (2011) agree that if the IT structure is implemented and managed accordingly, a business is likely to be more successful in the utilization of its IT resources. Benefits include but are not limited to lesser down times, which result in operation disruptions, minimal loss of productivity, cost reduction, increased revenue, better relationship building and overall support for the business to achieve strategic goals (Kabachinski, 2011). He also admits that the IT practices area is a huge undertaking, however when done correctly and with the support of senior management, it can also result in improved service delivery and value creation. Wahab and Soomro (2015), also agree that there is a high level of service satisfaction associated with the best practices of ITIL. Some of the benefits identified by them include the ability to share and reuse, the ability to follow the

lifecycle so that it is easier to align with business goals, ease of implantation as it is easily adaptable will little impact on the customer, it is easy to understand and overall it is very simple, efficiently integrated and assembled (Wahab & Soomro, 2015).

Many people find it hard to change with the times. So when an announcement is made that changes will be implemented, employees resist. This is an inevitable aspect of change. There are many reasons that cause unsuccessful implementation of processes. Esteves and Alves (2013) have identified several reasons why many ITIL implementations fail. The management is not committed to a successful implementation. They provide no encouragement to staff to accept changes and indirectly, they insinuate resistance. Some examples are:

- When people say yes to new procedures but don't really mean it.
- Even with new procedures in place, people continue to do what they always did.
- Negative attitude before implementation even takes place.
- Simply throwing ITIL solutions onto people and expecting them to catch-up. This leads to further resistance.
- No knowledge or understanding of business goals and the ability of ITIL to add value.

Overall, commitment by senior management is extremely important for the success for ITIL ((Iden & Eikebrokk, 2015). Involvement of senior management implies that top executives are committed to provide support to the project team for implementation. Iden and Eikebrokk (2015) also state that the involvement of managers from all levels is also necessary. Likewise, the commitment of the organization as a whole is equally important as all team members need to focus on achieving the organizational objectives and be willing to exert the necessary efforts for doing so. Successful implementation also requires sufficient training and knowledge as well as the skills required to identify, analyse and improve processes.

However, it is always important for business stakeholders to remember that being part of a service delivery industry means versatility is paramount to increasing the customer base and retaining existing customers. This means to change with the times and be ready to adapt to changes in the IT department. Furthermore, to keep up with changing customer needs and expectations. One of the important aspects of effective and efficient service delivery is the ability to deal with unexpected service requests with minimum effect on planned work. This is the main reason that businesses

choose to use best practice frameworks such as ITIL or COBIT (Gerdewal & Secim, 2014).

2.4 AUDIT, STANDARDS AND RISK MANAGEMENT

This section is split into 3 subsections. The first section provides an introduction to IT Audits detailing what is involved in it. The benefits of IT auditing are also discussed. The second subsection identifies the audit standards and the standard issuing bodies for IT. This third subsection encompasses an empirical study of 3 IT security processes and a discussion of risk management. It looks at how risks are management through risk assessment. The ways of assessing risks are also discussed here.

2.4.1 Audit

Auditing in general is a systematic assessment of an organisation's financial statements to determine if they represent a true and fair view. In addition, it involves the assessment of internal control procedures and whether a business is in compliance with relevant standards. This section will focus specifically on the audit of information systems/information technology. An information systems audit is an assessment of controls within an information systems infrastructure. Such audits are carried out in order to determine whether the controls in place are sufficient to safeguard assets, including information and are effectively aligned with the goals of the business. Because of the increasing volume of data, not only do auditors need to identify data, they also need to use the appropriate criteria to analyse it (Dzuranin & Malaescu, The Current State and Future of IT Audit: Challenges and Opportunities, 2016). Dzuranin and Malaescu (2016) have identified six concerns about data in terms of auditing. These are integrity, reliability, completeness, controls, security, storage and retrieval. They have also pointed out the potential of data resulting in false positives if the concerns raised are not sufficiently dealt with. They are particularly interested in the automation of compliance technology automation as it brings about benefits such as increased credibility of auditors, lowers costs, lower business impact, improved processes and controls, reduced risks, elimination of doubling up of controls and the ability to manage multiple frameworks.

In this era of technology proliferation, businesses need to be proactive about controlling and protecting their information assets (Merhout & Havelka, 2013). In most businesses, managers rely on internal audit to provide assurance on the

effectiveness of the control framework. Some are expected to comply with the US Sarbanes-Oxley Act which is briefly discussed in the next section. Dzuranin and Malaescu (2016), and Merthout and Havelka (2013) strongly support effective and efficient IT Controls and that it is up to managers to identify the risk factors. This is where security control frameworks become very useful and they provide guidance on what should be done.

Different organisations have different priorities when it comes to IT Audit. Audit priority depends on whether the business is private or public, its stock ownership and the regulatory framework under which it operates (Elements of an IS/IT Audit Strategy Part 1, 2016).

According to ISACA (2016), an IT Audit strategy has several elements. These elements have been identified by Gelbstein (2012). First there are suppliers, which include people like the Chief Information Officer and System Owners. There are other participants like members of the audit committee and the audit executives. The input elements includes business analytics, IT risk assessment, staffing, compliance requirements and other known issues. The next element refers to Domains which defines the scope of the audit universe, governance information and business impact. The deliverables in the IT strategy are audit priorities, standards, tools, staffing and audit plans. The audience includes senior management, audit committee, external audit in some cases and the chief information officer (ISACA, 2012). Within audit priorities are activities and processes that have the potential to have an impact on the business. It also involves the part that IT plays and recommendations of whether they have been implemented or not.

2.4.2 Standards

Sometimes companies struggle to put security measures in place. However, there are a few Governance Frameworks that they could use to for planning and implementing IT security. One of them is COSO, which mostly looks at internal controls and corporate finance and COBIT which creates better control of IT functions. There is also ISO/IEC 27000 which specifically deals with IT security.

As a result of the corporate failures such as Enron, significant changes were made in the area of auditing. One such measure was the US Sarbanes Oxley Act (SOX). While this Act mainly focuses on financial audits, there are two main sections

that set out specific audit requirements for IT. The Act required businesses to use a comprehensive control framework for IT Security. There are two main sections in SOX that are directly relevant to the area of IT Audits. These are sections 302 and 404. Section 302 is concerned with protecting financial data so that the company does not end up preparing financial reports based on faulty or tampered data. Failure to do so will potentially result in inaccurate financial reports. Section 404 stands to complement section 302 as it requires that all data protection safeguards put in place by applying this section be verified by independent auditors. As a result of the implementation of SOX, businesses have gained several benefits such as: greater focus on information security, improvement in information security, creation of IT Governance structures and guidance to IT managers on data protection. While SOX doesn't necessarily say that companies need to use a particular solution, but many businesses have opted to go for the Committee of Sponsoring Organizations of the Treadway Commission (COSO) framework to comply with the requirements of SOX. SOX is a globally accepted regulation and encourages managers to actively participate in integrating and standardizing the practices of IT management (Marquez, 2017).

The COSO Framework works with four objectives: Strategic, Operations, Reporting and Compliance. In addition, COSO has 8 components that need to interact with each other constantly. These are: Internal Environment, Objective Setting, Event Identification, Risk Assessment, Risk Response, Control Activities, Information and Communication and Monitoring. The focus of this thesis is the COBIT Framework which acts as a general planning and risk assessment tool that also broadly supports the governance of IT functions and resources. Like the COSO Framework, the COBIT Framework also works with four domains that follow the general systems development life cycle (Panko & Boyle, 2015). These are: Plan and Organize, Acquire and Implement, Deliver and Support and Monitor and Evaluate.

ISACA is one of the bodies that provides IS Audit and Assurance Standards to meet the compliance needs of professionals. These standards consist of the basic requirements of IS Audit and assurance. ISACA provides a comprehensive set of IT Audit Standards together with guidelines. For example, S15 deals with IT controls. It begins with an introduction of what the purpose of the standard is. Then it provides the standard itself followed by a commentary on how that standard should be applied.

Payment Card Industry (PCI) compliance is also important in businesses, especially the retail sector. Most brands have their own standards. For example, Visa

has Cardholder Information Security Program, MasterCard's Site Data Protection and American Express has a Data Security Operating policy. These programs have similar goals and was thus brought together to form the Payment Card Industry Security Standards Council (PCI SSC) who set out the PCI Digital Security Standards (PCI DSS).

These have several control objectives: to create and maintain a secure network, protect the data held on cardholders, maintain a vulnerability management program, implement strong access control, regular monitoring and tests, and maintaining an information security policy. These objective are met by meeting requirements such as having a well configured firewall to protect card data, avoiding using vendor supplied login credentials, protection of stored card data, encryption of card data over public networks, regularly upgrade antivirus programs, develop and maintain secure systems, restrict access to cardholder data, whether physical or electronic, monitoring network access to such data, regular testing and a succinct information security policy.

2.4.3 Risk Management

Risk in IT refers to the possibility that information and technology could be compromised through tampering and people may be able to gain unauthorised access to confidential and sensitive information. Risk management is one of the most important requirements for IT as it ensures a safe environment for IT projects (Irfandhi, 2017). The purpose of risk management is to prevent risks and where prevention is not quite possible then it reduces risks. Risks in IT can also be seen as uncertainty on the success of projects and the functions of the IT processes in general. In his discussion, Irfandi (2017) highlights threats and vulnerabilities in IT which can be in the form of undesirable events that can damage the IT resources of a business (pgs. 192,193). The process of risk management works by identifying the weaknesses and potential threats to IT, performing a risk assessment to determine the probability of an attack and the impact of potential of such attacks. In addition, there are four ways in which risks can be identified. These are through assessment as and when the signs of risks first appear, discussions with relevant people on what they view as potential risks, periodic assessment of repetitive tasks and a formal assessment process of identifying and evaluating risks. The best approach is to design controls around the risks that are identified (Dzurani & Malaescu, The Current State and Future of IT

Audit: Challenges and Opportunities, 2016). There are several tools that are currently available for risk assessments. The one that we focus on in this paper is Capability Maturity Model Interface (CMMI) which involves assessing processes and the current level and then looking at ways to get them to a higher maturity level.

There are many kinds of risks in IT that need to be catered for. Some of these are resistance to change, inevitable conflicts between team members, a negative attitude, lack of commitment and corporation, continuous changes, complexity as a result of using new technologies, insufficient planning and control, lack of experience in the team and an unorganized project environment. Computerisation of functions in business comes with advantages and disadvantages. On the plus side processes become faster with the capacity to process a greater volume of transactions. The down side is the risk of loss of integrity of information systems.

One of the basic areas of IT that is constantly under threat is that of access to critical systems as well as others. There is no shortage of criminals who can easily identify weaknesses in the password resetting processes and the overall complexity of the passwords set by people.

IT Risk like risks in other areas can be managed through appropriate steps. The first step is to make an assessment of each risk that is identified and what level of impact it could have on the business. The next step is to mitigate these risks. This refers to the protective measures put in place to prevent or reduce the effects of various risks. Lastly, the protective measures are evaluated to see if they are effective as well as cost-effective. It is also determined whether further improvements need to take place. As a result of computerisation, traditional audit methods have been replaced with Computer Assisted Audit Techniques (CAAT). As such, the need for a control framework is quite evident. ITIL can improve the effectiveness and efficiency of IT services while COBIT 5 acts as an integrated framework for the entire business that improves overall performance.

2.5 REVIEW OF ISSUES AND PROBLEMS

The main issue with COBIT 5 may be that businesses find the amount of information encapsulated into it, too overwhelming. But the solution is that COBIT 5 does allow processes to be broken down into smaller steps to make it more viable. Sometimes, trying to implement too much in too little a time can cause the implementation to fail. ITIL may create the same concerns but because it has been revised to meet current

business needs of IT services, it should be easier to follow. For both of these frameworks, the main issue comes from people resisting change or management simply not committing to the plan to implement the framework. This normally happens when employees are not aware of the goals of the business. This is attainable if employees are educated such that their interests are aligned with business goals. For businesses that are serious about IT security, the COBIT 5 framework provides the best practice processes and it can be applied to the private sector as well as the public sector. It may have a lot of information that people can find overwhelming. However, with the ability to break down the processes in smaller logical steps, it can be easier to implement. With the new threats to Information Security, that are ever changing and on-going, COBIT 5 helps mitigate the potential risks by assisting in setting appropriate policies. The seven phase life cycle for policies is comprehensive and allows for on-going effectiveness reviews to maintain efficiency. The audit strategy of COBIT 5 is also very helpful. It highlights exactly what the stakeholders are looking for and the steps that need to be taken to reach those goals. It effectively aligns IT goals with the business goals. ITIL on the other hand focuses on improving service delivery for IT departments, and focuses on service level agreements and prioritising of tasks while still accommodating the unexpected. It is also about resolving IT tasks with the ideology that if something can be resolved at the first contact, then it should be resolved at the first contact. However, there may be some access control issues. This is where COBIT 5 can complement the adoption of ITIL. The COBIT 5 framework ensures a high level of security while ITIL promotes best practices in service delivery. A combination of both implies effective service delivery while maintaining high security standards and best practices.

The information presented in the literature has been quite useful in defining the various concepts required for this study and identified the risks faced by retail business. The derived benefits of using control frameworks and the critical success factors associated with their implementation are paramount. However, they have not been successful in discussing the application of COBIT 5 in a business that uses the ITIL framework. More specifically, they haven't looked at the audit of specific IT processes in a retail business. In fact, these researchers do not provide insight for the assessment of the IT processes in any businesses. They are more along the lines of being prescriptive and identifying benefits if control frameworks are implemented. Therein, lies the potential for future researchers to select a business in any sector, map

their IT processes, and then carry out an audit on those processes. Another area of research could focus on businesses who implemented the two frameworks that are central to this study and determine if the expected benefits were actually achieved. Another research study could focus on businesses that implemented these frameworks but failed to derive the perceived benefits. These would include an evaluation of why the implementation failed to achieve these benefits. For this study, the researcher will look to collect data in a retail business. The data in this instance involves the assessment of IT processes within the business. With the performance of an IT audit using COBIT 5, the flaws within existing IT processes are expected to be identified as well as how these processes could be improved.

2.6 CONCLUSION

The main point derived from the discussion in this chapter is the need for improvement of processes when using control frameworks. It has been made clear that business risks, including information security, and these can be better assessed and managed by improving the maturity of existing IT processes. The purpose of this chapter was to define the main elements of the research topic. Firstly, a definition of a control framework work was given followed by the types of such frameworks available to businesses. This was followed by defining and discussing the COBIT 5 framework which is the central to the research. The features and benefits of this framework were identified backed by articles from academic researchers. The Capability Maturity Model Interface was succinctly discussed as it relates to chapter 4 where processes will be evaluated, and their maturity level is to be determined, together with identifying the processes of how a higher level of maturity could be achieved. The other main point was the collection of best practices for IT service delivery otherwise known as ITIL V3. With regards to ITIL V3, all authors have agreed that it is absolutely necessary for businesses to follow best practices in order to increase benefits. The better the business goals are aligned with IT, the more the value of the business will increase overall. These discussions have led to the conclusion that information security, business performance and risk management, IT Governance and IT Management can all be improved by following best practices. Therefore, to ensure best practices remain a focal point for retailers IT Audits of processes have to take place. Assessing the maturity of processes and determining and developing ways to

take these processes to a higher level of maturity forms an ideal way for continuous improvement and adoption of best practices.

The next chapter 3 will focus on data collection for the theme of process improvement. With the Capability Maturity Model Interface (CMMI) identified as the basis for data collection, the next chapter defines and discusses the data requirements for this research. The purpose of chapter 4 is to identify some IT processes in the retail sector that will be assessed for effectiveness and efficiency. It will describe the method via which data will be collected and recorded and ultimately presented. Any ethics approval required by the AUT Ethics Committee will be sought in the next stage which is defining the methodology (see appendix A for the approval documents).

Chapter 3

Methodology

3.0 INTRODUCTION

In chapter 2 the relevant literature has been reviewed in order to identify issues and problems that are researchable. The previous section started off with describing the various security concerns within the retail sector. These concerns are not just limited to the retail industry but are spread across all organisations that operate as a business as well as those who are connected to cyber space whether individually or as a group. The review then went on to describe what a security control framework is and its potential implications on business IT processes. Some examples of security control frameworks were also discussed. This was extended into a discussion on best practices in IT and how these could add value to business processes. The focus was then shifted to discussing what COBIT 5 is and the role it plays in aligning IT goals with the overall business goals. Because COBIT 5 is a major part of this project a comprehensive discussion was carried out regarding what it is and how it can be used within a business. The discussion then proceeded to the ITIL framework and its implications on improving IT service delivery. ITIL is also a principle component of this research and it was discussed in detail. The benefits and challenges of both these frameworks were identified. In addition, the elements of IT Audits and standards were also identified. The IT Audit standards, particularly those issued by ISACA, were highlighted. The section ended with a conclusion derived from the analysis of literature as to how a combination of two best practice frameworks could be used to enhance the benefits to a business. It essentially stressed the role that a control framework plays in a retail business. In particular, COBIT 5 being an integrated framework could be applied together with any other framework a business may have adopted in its operational processes.

This chapter 3 mainly has how to set out a methodology to answer the primary research question through data collection and analysis. As the topic has processes and their effectiveness, a qualitative approach to collecting data would be more meaningful. An attempt will be made to quantify effectiveness and efficiency components of the processes. The reason being that the processes need to be thoroughly analysed and understood. This is best done by getting information directly

from expert users. In the case of this project, the potential participants are experts in relation to the processes being observed. Therefore, rather than a quantitative approach, a qualitative approach is preferred. The purpose of this section is then to set out the steps to be taken to collect relevant data and how it will be done. The method of research is identified with supporting reasons, and the design of the research is specified. This is essentially identifying the processes required to collect data in a controlled manner as well as the inclusion of participants. How the participants will be selected is also discussed, keeping in mind research ethics such that no participants are inadvertently harmed or have their privacy compromised. Apart from this, any tools to be used in the research will be clearly identified. An assessment tool that will be used to determine whether processes have reached an optimum level is selected from the COBIT framework. This chapter 3 details the research topic as well as the research questions. There is the main research question but there are also sub-questions that are required to be answered in order to achieve the aim of this research. These will be stated together with how the questions can be answered. The research methods followed by researchers in the areas of information security and IT governance are given with the intention of understanding how to carry out research and the types of methods available to do this. There are several tried and tested methods that are discussed in the following section 3.1.

3.1 REVIEW OF SIMILAR RESEARCH PROJECTS

There are many options available to researchers when looking to collect data. These could be anything from structured interviews and surveys to unstructured interviews or merely observations. This can also be sourced from electronic devices such as foot traffic count devices that retail business use. Research backed by effectively manipulated data carries greater weight. However, data varies in presentation and the presentation needs to change to suit the audience whether it is tabulated, in a pie chart or a line graph. On one hand, it could be quantitative where research is backed by statistics. Otherwise qualitative data which may be in the form of opinions and suggestions. The following five researchers used a variety of ways to collect raw data. The common fact about these researchers was that they focused on IT frameworks and security, and most of the authors focused on research backed by qualitative data.

3.1.1 Implementation of ITIL

A study carried out by Ahmad and Shamsudin (2013) focused on the implementation of the ITIL framework. After determining the critical success factors through literature review they needed to test the framework. They identified a survey as the best way to collect comparative data. They selected 15 expert participants from a 13 year old firm. These participants were selected based on their resume. The experts were sent the survey via email and they all agreed to participate. The participants were assured of the anonymity and confidentiality of their feedback. The data from the survey was collated and was used to draw conclusions on the main research topic.

3.1.2 Resistance to Change

Esteves and Alves (2013) carried out a research on the resistance to change when implementing ITIL. These researchers selected a case study methodology. One of the main reasons for the selection of this method was the availability of information from stakeholders in the process. The research was carried out at the IT Department of the Transport Regional Department of Madeira. The goal of the researcher was to perform an assessment on the existing processes and make recommendations based on the best practice principles of ITIL. Various data collection instruments were used to record opinions of IT staff from different levels. These staff members included team leaders, administration staff and IT professionals. The researchers requested 12 interviews but were only able to perform 7 as others did not respond. The interviews contained several questions which helped identify issues faced by respondents. To add further value to the data collected, 2 questionnaires were distributed to the IT staff. The data collection process took too long in this case as the participants did not respond within the required timeframe. Reasons identified were little or no concern for the project and general carelessness. However, the researcher was able to gather data regarding resistance to change from the survey to draw conclusions and make recommendations.

3.1.3 Information Technology Service Models

Melendez and others (2015), focused their research on Information technology service management models. Their method of data collection was through a systematic literature review. The researchers were very careful about the selection process of literature work to be used. There were some very rigid inclusion and exclusion criteria.

They looked at aspects such as whether the selected study had been published in a journal or a conference or any workshops. It also determined whether the selected study was useful in answering the research question. The studies were derived from digital libraries and the publication types were conferences and indexed journals. In the initial stages, the researchers had identified over a thousand articles. However, after applying the exclusion criteria they ended up with about 380 articles. The quality of these articles was assessed for quality by checking to see if they had been subjected to peer reviewed. Finally, they ended up with 17 articles that they used in their research. The research methods within these studies included empirical, case study, experiment, survey and speculation. From the literature review, the researchers were able to make recommendations on how to select an IT Service model. Some of the basic recommendations were the determination of needs, alignment of business objectives, training, and definition if IT services and definition of monitoring indicators. There was a level of difficulty faced by researchers in selecting an existing model that they could try to use. The other setback was that some models were too complex and coupled with little or no motivation, made it difficult to improve.

3.1.4 Cloud Computing Security Framework

Rebollo and others (2014) also opted to use an exploratory approach through a case study to answer their research question. They performed an empirical evaluation to determine how a given framework could be improved. In their case the framework was ISGcloud framework which is concerned with supporting cloud computing via the development of a security governance structure. The researchers looked at four governance processes and the detailed steps on the tasks included in them. They used the Software and Systems Engineering Metamodel (SPEM) tool to model the tasks involved. Each of the governance cycles was observed to see if they needed refinement. Following an exploratory approach the researchers were able to assess the performance of the framework as well as to discover insights and new ideas to improve the framework. To get more details on these insights, interviews were conducted along with the distribution of questionnaires to the different parties involved in the processes. They were asked to provide some feedback in terms of ease of use, usefulness and how it could be improved. All this implies that it was a qualitative research approach that was the best for the situation. The researchers happened to work

in the business that was subject of the case study, making data collection easier for them. In addition, the participants were invited to give their opinions on how the security processes could be improved. The feedback from participants was used to provide recommendations on how cloud security could be improved.

3.1.5 Role of Chief Information Security Officers

Whitten (2008) carried out a research on the role of Chief Information Security Officers (CISOs) and the role they play in enforcing IT Governance and Information security. This was an exploratory research and the researcher employed the unstructured interview technique to collect data. The researcher had identified a list of qualities required in chief security officers from literature review. The list was presented to participants who were in this role and were asked to give their opinions on that list. A lot of valuable information was gained through an unstructured interviews where participants made additions to the list of skills with a detailed discussion justifying their suggestions. As a result of this method of data collection, the researcher was also able to determine what CISOs thought was the most important part of their role. In this case, they concluded that it should be disaster recovery planning. The participants were selected from various companies and the interviews were mostly carried out in person and some over the phone. After this, the researcher analysed job listings for security officer roles to determine whether there was a variance between what CISOs think should be the required skills in their role and what skills employers expect from CISOs. Finally, the main limitation highlighted by the researcher is that there weren't many job advertisements available for the role of CISOs (This was in 2008). However, with the available listings the researcher was able to identify the key skills required by employers in the said role.

3.2 RESEARCH METHODS

The research methods identified in the last section are directly applicable to this research. A number of qualitative research methods have been identified from similar research projects. The methodological approach for the purpose of this research is also qualitative in nature where information is drawn from unstructured interviews. Qualitative research by nature allows researchers to gain greater understanding of human and computer interactions and the reasons why they behave the way they do.

It helps discover the reasons for motivation and trends in the way that people think. Qualitative research methods are employed in various areas such as academic disciplines and market research. The fundamental characteristic of a qualitative approach is subjectivity. The researcher interacts with the research, the data collected is very valuable but biased, it forms an inductive process, is generally unstructured and ultimately allows the development of theories (Park & Park, 2016).

There are two main information technology frameworks being used in this research. The first is COBIT 5 which is an integrated control framework that enables the alignment of IT goals with that of the business. The other framework is ITIL version 3 that promotes best practice in the delivery of IT services. Since these frameworks prescribe processes rather than statistics, this research looks at the quality of the processes being followed. Observation is the main means of trying to understand the processes that the participants will follow. Noting down details of the processes will be essential in drawing conclusions later. The other means of collecting data will be unstructured interviews. Such interviews are a qualitative way of collecting data. When used correctly this method is particularly useful in gaining insight and context in processes (Eriksson & Kovalainen, 2008). Such a way of data collection allows a participant to discuss what they think is important rather than a bottom-line derived from surveys and questionnaires. The researcher in this case will be able to build a rapport with the participants, and gain the opportunity to make observations. An added benefit here is that the researcher can ask probing questions to further clarify the participants' responses (Collis & Hussey, 2007). Participants will be asked some open ended questions to encourage them to discuss their opinions as these will add value to the data being collected and thus enhance its richness (Gillham, 2000).

3.3 RESEARCH DESIGN

The first part of the research deals with a literature review of relevant works in this area. Most references were made in the area of academic articles. However, to put the emphasis on explanation some technical concepts text books were referred to as well. A lot of information was obtained from ISACA particularly because they are a principal authority in the area of IT Audits. The main purpose of the literature review was to define what the 2 frameworks of focus are: COBIT 5 and ITIL Version 3. In addition to definitions the benefits and disadvantages of these frameworks were identified. Also discussed were the challenges faced when implementing such

frameworks. Furthermore, the literature review discussed risk assessment and management as well as standards in place for risk management. The literature review has paved the way to collect practical data to get data that can be used to answer the research question.

The data collection part of the research looks at a business in the retail industry. This business is one that has adopted ITIL V3 as a standard framework for service delivery purposes or at least on its way to completely doing so. The next part of the research involves observing IT staff members observing three tasks. The first step here is to invite people to participate in this research. To promote the principles of voluntary participation, an advertisement will be placed on the staffroom notice board to invite potential IT experts to participate. The subject matter of the research will be stated i.e. IT Audits. A brief summary of the requirements will also be provided. Once participants forward their interests to the given contact details given, an information sheet will be given to them highlighting the intricate details of the research. Together with this, they will be given forms to sign with regards to participation. It will be made clear to the participants that this research does not involve collection of confidential or sensitive information. Rather, that it is a process focused research. Participants will also be informed that since this is an open research it will not be possible to keep the names of the participants private. However, they will also be advised that once data is collated no one will be able to identify the participants. Finally, an appointment will be set to carry out the relevant tasks and accompanying observations and questions. The first task will be the End of Day process at store level. The participant will be asked to perform the task as they normally would. It is understood that this task will be performed at the close of business for the particular store. Notes will be made as the participant performs the task. Once the task is completed the participant will be asked to describe the process they followed and why they followed that process. They will then be asked what they think are the flaws in the process and how it could be improved. They will then be given an assessment tool to give a rating on the process they followed. This tool is described later in this section. The next task is the campaign loading process. As with the last task, the participant will be asked to perform the tasks while observations are made will notes taken down. Questions will be asked as in the last task. The third task involves processing security access requests and will follow a similar format for data collection.

Towards the end, the participants will be asked for a rating on the process according to the ISACA capability maturity model. An explanation of this model will be given to the participants before asking for a rating. Probing questions will be asked in order to draw detailed information from them. The idea is to encourage the participants to explain and discuss more rather than the researcher having to ask more questions. For instance, if the participant has come up with a suggestion on how the process could be improved, they will be asked questions similar to:

- Why do you think your suggestion will improve the process?
- How would you apply your recommendation to the existing process?
- How else can this process be improved?
- The suggestions that you have made, will they affect other parts of the business?

It is not necessary that these exact questions will be asked. Rather it depends on where the discussion leads when the participants start explaining their thoughts. These discussions on their own will provide the opportunity to ask relevant questions. Asking open ended questions will result in answers that provide deeper insights.

The assessment tool to be used is the ISACA Capability Maturity Model. A process can be given a rating using this on a scale from 0 to 5. 0 being the lowest score where the process implementation is incomplete and does not achieve its goal. A score closer to 5 implies that there is a predictable process in place which is being improved on a continual basis to meet current and future business goals.

The assessment tool is as follows:

On a scale from 0 to 5, how will you rate the process you have just performed in terms of effectiveness?

Fig 3.1 Scale for Capability Maturity Model Interface



Key:

5 Optimising	The previously described predictable process is continuously improved to meet relevant current and projected business goals.
4 Predictable	The previously described established process now operates within defined limits to achieve its process outcomes.
3 Established	The previously described managed process is now implemented using a defined process that is capable of achieving its process outcomes.
2 Managed	The previously described performed process is now implemented in a managed fashion (planned, monitored and adjusted) and its work products are appropriately established, controlled and maintained..
1 Performed	The implemented process achieves its process purpose..
0 Incomplete	The process is not implemented or fails to achieve its process purpose. At this level, there is little or no evidence of any systematic achievement of the process purpose

(Source: ISACA – COBIT 5)

The assessment tool in this section is based on CMMI (Capability Maturity Model Interface). It works to provide guidance to IT professionals so that business processes can be improved and essentially promotes high performance operations. CMMI is actually a revision of the CMM (Capability Maturity Model). This tool has 5 levels of maturity. These levels from down up are Initial, Managed, Defined, Qualitatively Managed and Optimizing.

In this case, it starts with 0 (Incomplete). Here there is no specific process implemented or if a process has been implemented then it is not effective. For example, a service call is logged by the service desk but is assigned to an unmonitored queue. There would be a slight possibility that an IT specialist may take the initiative to look into such a queue and resolve the issue. However, this is not an effective process which focuses on operational effectiveness and efficiency. At level 1 (Performed), there is actually a process in place. So this is an improvement from level 0. However, this is not the most efficient process nor does it fall in the category of best practices. Moving on to level 2 (Managed), there is some context to an efficient process. The level of maturity is a result of planning the process, monitoring to see whether it meets objectives and is adjusted as needed to ensure that objectives are met. Once a more defined process is used to level 2 maturity, it becomes capable of achieving the process outcomes and thus, arrives at level 3 (Established). When a defined limit is added to level 3 such as timeliness standards and correct categorisations of IT issues raised, we arrive at level for which is a predictable level of maturity to achieve objectives. Level 5 (Optimising) is when it has reached the optimum level of maturity for processes and we continuously try to improve this further. Continuous improvement is based on current business goals as well as those

projected for the future. Therefore, processes are adjusted depending on what goals are chosen.

The actual interview will be recorded on an audio recording device. However, while the participants are performing the tasks the researcher will simply observe and make notes with little or no disturbance to the participant. The task itself will be carried out within the work environment where the participants are expected to be most comfortable.

3.4 RESEARCH QUESTIONS

This research is primarily focused in the area of IT Audits which is mostly about compliance and best practices. Additionally, there are aspects of IT Governance and Information Security, since auditing is about keeping track on things to ensure they are working efficiently and according to standard operating procedures. The main research question is: What Value can COBIT 5 add to ITIL Adoption?

There are several elements attached to this. The first statement; “Security Control Framework Impact in the Retail Sector”, is the unwritten context that brings a focus to the retail sector concerned. The first one is that of security which in this case applies to protection of corporate information. Next, it identifies that the focuses looking at protecting information in the retail industry. This shows the various threats that retailers face all over the world, and there are security control frameworks available that can enhance security in retail businesses. It incites curiosity as to what these frameworks may be and how they function. The statement overall, then becomes quite simple in explaining that this research looks at how the application of a security control framework affects retail businesses. Looking at the main research question makes it clear that this research looks at two frameworks. The first being COBIT 5, which is an integrated framework which covers a business end to end. The other framework is ITIL V3 which is a framework of best practices for delivery of IT services. Therefore, what this research is trying to achieve is to see if implementing ITIL while using COBIT 5 creates any additional benefits for a business. In this subject matter, the business being observed is already a follower of ITIL principles. This means, it will be able to make an assessment of whether a control framework such as COBIT5 will have an impact on the business and if this added framework will prove to be complimentary to the existing one.

The primary question for this research is: What Value Can COBIT 5 add to ITIL adoption? The answer to this question will be achieved by focusing on the following sub questions: What is the capability maturity of existing IT processes? How can COBIT 5 improve these processes? Does COBIT 5 enhance Information Security while improving service delivery? What is the resistance level to change for IT staff? What are the compliance requirements in place? The research specifically focuses on the impact of security control frameworks in the retail sector. These are sub-questions within the research where by a cost benefits analysis is performed on the two frameworks of focus. It is then determined whether or not an integrated framework like COBIT 5 will add value to a business if it is implemented together with a service delivery focused framework which in this case is ITIL Version 3.

A business is selected with these questions in mind. The business function and its processes will be the focus of this study. These processes will be observed and understood so that the research questions can be answered with the basis of practical data as well as theoretical findings and other research material.

3.5 DATA REQUIREMENTS

Data for this research needs to be collected from a retail environment where the IT department is ITIL focused. The primary researcher happens to belong to this industry and thus has access to relevant data. The means of collecting this data has been defined in the research design section. This section, however, concerns the type of data required to be able to draw conclusions. The type of data required for this purpose is subjective. Participants are not expected to have the same opinions through and through. The expectation from the participants is to perform a task and then answer some questions in an unstructured interview. The idea is to keep the participants discussing the task they have completed. The logic behind following a certain process and its effectiveness forms the core data requirements. In addition, their opinions on how the process they followed could be improved using an assessment tool is another requirement. The tool is the COBIT capability maturity that has been detailed above.

There are three main areas of IT processes where data will be collected. The first one is the process involved in security access requests. This refers to how an IT technician processes an IT request for new or existing staff members. The request authorisation criteria as well as the process followed to grant or change access will also be identified. The next IT process being studied will be the end of day process at

a store. Here the researcher will look at the overall definition of end of day and what it means to the staff members performing this task. The researcher will look at what initiates the end of day and how the person in charge goes about doing it. The steps they follow will be identified. Finally, he will look at the campaign loading process. Ideally, he will be able to observe a merchandise systems administrator do this. As with other process, the researcher will note down the steps such as where the request comes from and who authorises it. In all these process, the participants will be invited give their opinions on the advantages and disadvantages of these processes and how in their view, these processes could be improved.

Three IT processes are to be observed as they are being performed: End of day processes, security access requests and loading marketing campaigns. First a respondent will be observed as he or she does when receiving a security access request form. The researcher also looks at the method in which the request is made. Then the researcher looks at what the respondent does next. Whether, he gets down to processing the request right away or does he need to consult with another team member or team leader and what action to take. As the respondent looks at the request form, the researcher will note any comments made and his or her interactions with the computer system as well as interactions with those around him. The researcher will also note the time he takes to complete the process. Also noteworthy is whether there are any interferences or distractions that prevent the task being completed in one iteration and if so, what these may be. This introduces one of the first questions that may be asked as part of the unstructured interview: the process that a person just followed to complete this task, is that a standard operating procedure or is something different followed each time?

In the case of End of Day process, a similar process is followed. Human computer interaction as well as human to human interaction is also important. The human to human interaction is important because this directly involves other people who contribute to this process. To specify, each branch has multiple Point of Sale systems, each of which needs to be closed before the Back office person can start the said process. Closing of the POS systems is a rigid process however, users have been known to make errors and incorrect assumptions from time to time. This affects how the back office person performs their task. It will be interesting to note how the back office person reacts to errors and the steps taken to correct them. Notes will be taken as to how well the back office person knows about the application they use. As this is

an end of day process, it is prudent to acknowledge that most staff will be in a rush to go home. Errors are most common when a process is rushed therefore, the researcher will need to observe the procedures in place to prevent such errors. The researcher will also look at the speed at which the back office person performs the task and whether they themselves make any errors and what they do to fix them. Facial expressions, consultations and distractions will also be duly noted.

Loading of campaigns is an important part of the retail sector. This can be a cumbersome task for the person in charge of loading campaigns. The reason being that there are multiple campaigns which are going on and each has to be loaded and applied on a timely basis. It will be quite interesting to see how the different campaigns are managed and the reaction in the event of errors. In other areas, the essence observations will remain the same in this case. The researcher will look at how the respondent interacts with the computer system as well as those around him or her. The time to load the campaign will be noted. At the end of performing the process, an unstructured interview will be carried out. The questions will unfold depending on the how the process is carried out.

The following will be a checklist of tasks to be completed by the primary researcher:

- Human computer interactions
- Human-human interactions
- Time taken
- Number of distractions, interferences and other delays
- Educating the respondent on capability maturity

The following summary will be provided to the respondents in an effort to educate them on capability maturity model:

“The tool handed to you is a derivative of a capability maturity model. Capability maturity here basically refers to how processes have been refined to make them effective and more efficient. This model has a 6 level scale. So your task now is to give a rating on the task you just completed. Therefore, on a scale from 0 to 5, where 0 is least effective and 5 is the best possible level this process could reach, how would you rate the process you followed?”

The respondents will be encouraged to ask any questions in regards to CMMI so that they have thoroughly understood the tool as well as the purpose it serves. Once they have understood what it is, they will be asked to point out the capability maturity level

at which they think a given process stands at. The ratings are expected to be given based on how closely the structure of the process performed matches the maturity levels on the capability maturity model: Incomplete, Performed, Managed, Established, Predictable or Optimising. They will also be asked about how they think this process could be better performed.

There are a few specific capabilities that need to be tested and measured. These are effectiveness and efficiency. A third capability is a combination of timeliness and user satisfaction. With effectiveness we look at whether the process objective was achieved. Efficiency looks at how well the process was carried out in regards to accuracy and completeness whilst still achieving the objective. Finally, timeliness/satisfaction refers to whether the task was completed within the expected timeframe of the user as well as the service level agreement of the IT department. While most of the data for this research is mainly qualitative in nature, there is an aspect that will be quantified using the standard, ISO/IEC 9126-4 Metrics.

There are two components to effectiveness. The first one is the completion rate which is calculated by dividing the number of tasks completed successfully by the total number of tasks under taken. For example, an IT service request received may consist of a number of tasks. A percentage off effectiveness can be determined based on the tasks that are completed. The next component of effectiveness is the number of errors. For the purposes of this project, the errors will include the number of distractions, interferences, system outages and clarifications needed amongst others. We will also be looking at the efficiency with which tasks are performed. The efficiency that we are looking at is time based. So the researcher will note down the length of time taken to complete a task and eventually compare this with how other entities process similar tasks.

Immediately after the tasks are completed an unstructured interview will be carried out. The goal is to provide insight into the challenges faced by participants from their point of view. They will provide suggestions on how these challenges could be met and ultimately improve the effectiveness and efficiency of the processes.

In summary, the data requirements include identifying process within a retail business, how these processes are performed and how the performers of these processes feel about the effectiveness of these processes. The purpose of collecting this kind of data is to identify how processes work within businesses and whether they are actually following what we regard as best practices. In addition, it is vital to gather

their opinions on how they feel that best practice could be achieved. Ultimately, this data will be used to assess the effectiveness of processes based on the Capability Maturity Model of COBIT, In order to determine whether the processes are working at optimal levels or if improvements are required. How this data will be analysed is discussed in the next section 3.6.

3.6 DATA ANALYSIS

Once the data collection process is completed, it will be analysed thoroughly to determine how it can be used to bring about improvements in IT processes. A content analysis will be performed on the recorded interview data. It involves coding the data and classifying it with the aim of highlighting the main points delivered by the participants. This research has qualitative data, and hence NVivo will be used to analyse the data. NVivo is software used for qualitative data analysis where data is unstructured and does partly not involve numbers. NVivo assists researchers in organising, analysing and deriving insights from data collected to through unstructured interviews. Without NVivo, a researcher's ability to draw conclusions from unstructured data is limited due to being time consuming and the difficulty in navigating through the data. In this case, the data recorded on an audio recording device will be transcribed into Word documents and then entered into NVivo. This will assist in organizing the view and ideas presented by the participants in regards to effectiveness and improvements, Through NVivo the researcher will be able to identify the underlying trends in thought and potentially the motivations that the participants have in making the suggestions they do.

The first artefact the researcher will analyse is the process flow of each of the process we will be studying: Security Access Request, End of Day and Loading Campaigns. This data would have been collected as a result of observations. At this stage the idea is to determine whether the processes are at par with the industry standards as well as best practices such as ITIL. Next we will look at the data collected from participants from the unstructured interviews. Here the researcher will look at dissecting their opinions and suggestions and try to determine whether or not they are feasible and if these ideas will generally contribute to improvement in processes. The researcher will also look at finding out why, if at all, the processes are not actually best practices. Furthermore, the researcher will look at how best practices could be brought about. Lastly, he will look at the assessment tool and how the participants

have rated each of the current processes. The rating will need to be given on a scale from 0 to 5. As discussed in an earlier section, the assessment tool used is the COBIT 5 capability maturity model. A thorough study will be done to determine the logic behind these ratings. Then, in accordance with the principles of COBIT 5 such as best practice and integrated approach, recommendations will be made on how to improve the existing processes.

The analysis of the unstructured interview will involve listening to the audio recordings of the interview and determining the themes that emerge from them. This will also allow us to establish categories for the data that is collected. To ensure no important data is missed out on, the recordings may have to be played a few times. Dragon software will be used to assist this process. Apart from identifying themes, data will be verified and confirmed by looking at notes made during the observation and interview process. If needed, confirmations will also be sought from the participants. While listening to the recordings an open coding approach will be taken where notes will be made of words, statements, ideas and theories. Any deviating data recorded as a result of the participant going off topic will be ignored. From the notes made, a list of categories will be compiled. This list may be made shorter if the categories seem to overlap. If the list of categories seems too long, it will be refined by grouping them together. To ensure that the data analysis is free of bias, it will be validated via peer review by an experienced researcher, in this case the research supervisor. This in turn will also allow for new insights derived from data analysis. The categories will be classified and summarised, and a discussion and explanation will be linked to the Research Findings chapter. The aim of this is to highlight the main points of the findings. This, as discussed earlier will be done using NVIVO software. The themes that are identified will be critically analysed to determine why certain things happen. For example, if all tasks are not completed then why aren't they completed? What causes these delays? Are there ways to avoid these delays? What are industry standards in dealing with such elements and whether the industry standards suit the specific business environment? Business specific processes must be taken into account when looking at this data. For instance, when the researcher is looking at the improvements recommended by participants, he needs to consider whether applying these suggestions would affect any other segment of the business. The aim is to identify a framework that has an integrated approach that supports all stakeholders rather than a selected few.

For comparative purposes, the percentage of efficiency, effectiveness and level of satisfaction will be calculated for each task. Comparisons will be made with new percentages calculated based on the improvements recommended by the participants for each of the tasks. This will help the researcher determine whether the recommendations will allow for improvements in effectiveness, efficiency and satisfaction. This data will be presented in a tabular format for easier understanding, and the data can also be compared to industry standards in efficiency.

In addition, the following hypotheses will also be tested:

1. Improvement in technology can result in greater efficiency of processes
2. Most IT processes are performing at an optimum level.
3. Resistance to change can deter the effectiveness of best practice frameworks
4. Staff education through training contributes to better performance of processes

In summary, the data in the form of opinions, collected from the participants can then be used to compare and contrast with what is seen as best practice. The ratings that participants give to processes are particularly important. This, together with the primary researcher's observations will form the analytical portion of this research. The reason being, it is the basis of IT audits in the retail sector and the application of control frameworks to manage cyber threats and promote information security. In addition, conclusions drawn from literature review will be compared to what was discovered from the data collected.

3.7 CONCLUSION

This chapter 3 specifies the main research question and the secondary questions that lead to answering the main question. The secondary questions form the objectives for the research. These questions enable a better understanding of the two frameworks in question and the pros and cons associated with them and whether they can add value to business goals. To answer these questions, it is determined that a literature review of academics works will provide relevant and quality information in the first instance. In addition, to enhance the quality of findings from literature, use of practical data is recommended. It was decided as a result of a review of past research work that this research will be qualitative in nature. Therefore, data will be collected from one large company through unstructured interviews and observations. There is an aspect of

observations involved as well, whereby notes will be made on processes being performed by participants. The unstructured interviews will be recorded on an audio recording device and later transcribed into Word documents. The data will then be analysed using NVivo software. The interview itself will be conducted in the English language as this is the primary language of communication in New Zealand business.

With the methodology of research defined, the next step is to port this into practice. In order to compile a report of findings in Chapter 4, the procedures described earlier will be followed. This means that people will be invited to participate in this research according to the AUT Ethics Committee requirements. Data collection in association with unstructured interviews will be carried out and reported in the next chapter 4. The retail business in question is very supportive of research work, as are its team members. Following the placement of the advertisement inviting people to participate, while the expectation is for at least 3 people to volunteer, it is highly likely that more than three people will be interested. All that are interested will be included in the research. On one hand it may extend the timeframe required for data collection while on the other it will enhance the quality of the data collected.

The next stage involves advertising for participants wanted for research. Those interested will be given the relevant information about the research as per the ethics requirements. Appointments will then be set with participants in regards to the tasks that need to be observed and rated. Notes on observations will be made while the interview itself is recorded and transcribed for analysis. Finally, all findings will also be reviewed in detail.

Chapter 4

Research Findings

4.0 INTRODUCTION

The chapter 3 identified the three main processes for maturity assessment and defined the methodology for data collection from the related processes. The processes for assessment are: Security access request process, end of day process, and campaign loading process. The method of data collection involves recruiting participants via an advertisement on the staffroom noticeboard followed by observations while they perform a task; and then an unstructured interview. The interviews will be recorded on an audio recording device and will later be put on a transcript application using Dragon Naturally Speaking. This is a speech recognition application that translates voice into text. Additionally, an ethics approval was granted by the AUT Ethics Committee to carry out this research. Upon finalising Chapter 3, an advertisement was placed on the staffroom noticeboard at the company so that all interested persons could contact the researcher for participation. When contacted by the potential participants, all necessary information was given to the participants. This included a signed form confirming voluntary participation and details of the research.

The subject of this research is a retail business, which is a large company distributed throughout New Zealand. The company has been operating in New Zealand for several decades and is one of the largest employers in New Zealand, employing over 5000 people. The business is a known department store in New Zealand and frequently runs various marketing campaigns to attract customers. The research was undertaken in the head office and control centre for the company in Auckland. Information Technology is central to this business and there are numerous IT processes within it, and thus makes it an ideal business to perform an IT audit. The IT department works closely with the ITIL framework for best service delivery standards which it continuously tries to improve. The capability maturity tool from COBIT 5 is introduced as an innovation to the processes in this business to see how these processes could be further enhanced.

In this chapter 4, responses to the advertisement have been received. More than 3 people have shown interest in participating in research, ten to be precise. However, there were those from areas that were not in the areas of interest for this project. From

the ten people, four were included in this research that came from the target area. There was one participant each for campaign loading and end of day processes. There were 2 interested persons for the security access request process. They have been given more information about this research, and the focus area of IT Audits and process improvement. Also, it was made clear that this is open research and does not deal with any sensitive or confidential information. The chapter 4 is structured such that raw data from each process is recorded. Section 4.1 begins with introducing the process of security access requests at the Head Office level. A process is described in detail for effective understanding. The data collected from the observation of the processes and then data collected from unstructured interviews is then reported. Furthermore, the participant's assessment of the maturity of the process is also recorded as well as a discussion of their reasoning. This reasoning forms an important part of analysis that is carried out in Chapter 5 as recommendations will be based on the data and analysis. The same structure is followed for processes in sections 4.2, 4.3 and 4.4. However, the data for each process is expected to be different as are the reasons that the participants give for assigning a level of maturity to the process in question. The chapter concludes with a summary of findings which also includes the calculation of effectiveness and efficiency of each process. This recorded data essentially leads to the next chapter 5 where a rigorous analysis of data will take place, and the meaning of the data can be uncovered.

4.1 PROCESS 1 – SECURITY ACCESS REQUEST - SUPPORT OFFICE

This is a process that is generally followed when a new employee joins the support office. The line manager completes a form indicating what applications the employee will need as well as stating the necessary file access levels. The line manager also adds the date that this request has to be completed.

The participant is Diploma qualified in IT and has several years of experience as an IT Desktop Support person at an advanced level and familiar with the ITIL framework. While familiar with standard operation procedures, the participant is not familiar with IT Audits. In a normal day, the participant provides first level support to store staff and members of the support office.

4.1.1 Observation

Table 4.1 Process 1 - Observations

Number of Tasks	Check form for require by date (1) Check for appropriate approval (1) Active Directory Account Email (1) Folder access (1) Applications access 1) SAP Account (1) Update requester (1) Close request (1)
Time taken	15 minutes
Number of Distractions	Phone call (2 minutes) Clarifications needed (2 minutes)
Human Computer Interactions	Service Desk Plus Active Directory SAP Admin MS Outlook
Human-Human Interaction	Clarifications with requestor Clarifications with colleague

4.1.2 Effectiveness and Efficiency

The following table shows a calculation of the effectiveness and efficiency of the processes.

Table 4.2 Process 1: Effectiveness and Efficiency

Effectiveness	$8/8 = 100\%$
Efficiency (Time)	$(15 - (2 + 2))/15 = 73\%$

The effectiveness of this process is at 100% because all requested tasks were completed fully. It was the efficiency that was affected due to clarifications that were needed. The total amount of time taken to complete the task was 15 minutes. Out of

that 4 minutes were spent seeking clarifications. Therefore, technically the task could have been completed in 11 minutes. As such, the efficiency for the process stands at 73%. The participant uses the computer system quite confidently as he is an experienced user and knows his way around. The same goes for interactions with other people within the team where clarifications are required.

4.1.3 The Interview

In describing the process of security access requests the participant called the request a MAC form. MAC meaning Moves, Additions and Changes to existing or new users. The first thing the participant does is to check to see if the form is correctly completed with the user's name, the required by date and if it was approved by the appropriate manager. Also makes sure that all the writing on the form is clear and then proceeds to creating the access. Once the access is created, the request form is filed and the requesting manager is sent a confirmation of request completion.

Weaknesses identified by the participant included cases where the requests were not very clear or when there were a backlog of requests. Also, the participant is not an advocate of using paper forms as sometimes handwritten requests are hard to read. He recommended that this could be improved by the use of web forms which would create electronic requests and also save on paper. Another issue highlighted was that staff members came to the participant directly to make general IT requests rather than going through the appropriate channel which is to log a call with the Service Desk team who will then assign the IT request to the appropriate team. Staff members coming directly to the participant delays the ability to process security access requests in a more efficient fashion. The participant concludes that it is important to educate staff members on following standard operating procedures so that requests can be given an appropriate level of priority. The participant also confirmed that there is a service level agreement in processing such requests and that the tools he uses to complete the requests are quite effective.

The participant was then asked to rate the maturity of the process based on COBIT 5 CMMI. He gave it maturity rating of 3.

Table 4.3 Process 1 – Maturity Rating by Participant

Maturity Rating	3 Established
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The participant based this rating on the weakness and the need for improvement that he had discussed when describing the process. These included the lack of clarity in the

requests and the distractions faced when trying to complete the request. He sees the process as quite effective but that there is room for improvement. One of the main suggestions from the participant was to use web forms for such requests rather than a paper form. He was asked whether implementing this would have any impact on any other segment of the business. He said that there would be an impact because staff members would need to learn to use the system but in the long run it would save on costs such as paper and ink as well as time. Currently staff members have to manually complete forms and then take it to a manager for approval and then send it to IT. With a web form, requestors can complete it online and the manager would be sent an automated alert for approval. With the difficulties faced by those who are not very good with computers, a comprehensive user guide would make it easier for them to understand the process of using web forms. The participant also stated that while the implementation of web request forms would seem costly, in the long run it is more efficient and will definitely save the business money. Plus, he sees reduction in the use of paper as protecting the environment. Furthermore, the participant added implementing improvements would not meet user expectations immediately but it would make it so in the long run.

4.2 PROCESS 2 – CAMPAIGN LOADING

Planners from the merchandise department normally design the various promotions for different occasions. These promotions are received by the Central Merchandise team in the form of a Point of Sale (POS) promotion sheet. The promotion sheets are loaded onto the Head Office POS server. These promotions then flow down to the Back Office servers and then down to the individual POS systems at the shop floor.

The participant holds a Marketing Degree and has been performing this task for 2 years. Apart from campaigns the participant is involved in maintaining pricing and merchandise database and is considered to be at an intermediate level in terms of the tasks performed. The participant is not familiar with ITIL or IT Audits.

4.2.1 Observation

Table 4.4 Process 2 - Observations

Number of Tasks	Create Folders (1) Set date and name for promotion (1) Create AR data (1)
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	Rename files with current date (1) Format data into 2 categories (1) Check for errors (1) Second person check (1) Convert file to CSV format (1) Recheck formatting (1) Second person check (1) Load onto BizTalk (1) Record confirmation from BizTalk (1) Send confirmation to Marketing (1)
Time taken	25 minutes
Number of Distractions	A second person check required (2) Clarification required from Marketing (3)
Human Computer Interactions	Microsoft Excel Microsoft Outlook Biztalk (SAP)
Human-Human Interaction	Team members (5 minutes) Marketing team(3 minutes)

4.3.2 Effectiveness and Efficiency

The following table shows a calculation of the effectiveness and efficiency of the processes.

Table 4.5 Process 2 – Effectiveness and Efficiency

Effectiveness	13/13 = 100%
Efficiency (Time)	17/25 = 68%

As far as effectiveness is concerned, all tasks were performed. However, with regards to time management, clarifications and second person checks were required. This may have resulted in less than ideal efficiency standards. The participant knows the system well as a result of several years of experience. So she doesn't need to ask questions in regards to what needs to be done when performing her tasks. She also knows who to go to or call when needed.

4.2.3 Interview

The participant was asked to provide a description of the process. She advised that for her the process starts when the Marketing team sends her a promotions traffic sheet. Once she receives these sheets, she creates folders and names them by date and promotion type. She then goes back to these folders to check to see if the promotions have been added to the folders accordingly. She then creates Advance Retail (AR) data in a Microsoft Excel sheet. This data is then spell checked and date checked and then the data is formatted in the required way. A second person check is also carried out to minimize errors. The campaign itself is divided into 2 categories: POS (Point of Sale) and Ecommerce. There are rules set for the Merchandise team to follow so as to maintain consistency especially with the description of the marketing campaign. Once the checks have been carried out the Excel sheet is converted into a CSV file and given a promotion number. Once more, a second person check is carried out in an effort to maintain 100% accuracy. After this, the CSV file is loaded onto BizTalk which in turn sends the promotions to stores at specified times. Once the CSV file is loaded, BizTalk sends a confirmation email to the participant to say that the campaign has been successfully loaded. This conformation is recorded and forwarded to Marketing to let them know that the particular campaign has been loaded. Ideally, the application of campaigns loads on promotion days flawlessly. However, unexpected errors occur as well as sudden changes in promotions. These need to be accounted for as well and changes need to be applied accordingly. Changes to promotions are brought about due to the Planners decision-making feedback loops. This includes changes in the promotions from key competitors or when a previous marketing campaign did not meet sales targets and the planner decides to conduct a more competitive campaign. When this happens, the participant has to start her task from the beginning again to load the campaign. It also means that the new campaign will also have to be checked by a second person yet again. This also increases the likelihood of errors particularly if the changes are made at the last moment. And in turn it means that more fixes will need to be loaded. Errors in promotions mostly affect those on the front lines dealing with customers. When customers do not get the advertised prices, it leads to other implications for the business as a whole.

After describing the process, the participant went on to discuss factors that caused delays in her performing the tasks. One of the issues was that while the Marketing team was supposed to send in the AR sheets two weeks before the

promotions are to be loaded, they normally send it in four days in advance. This tends to put a lot of pressure on the team when there are several campaigns to be loaded. This in turn can result in potentially more errors in loading the campaigns.

The participant was then given a printout of the CMMI assessment tool. The tool was described to her with what each level of maturity implied. She was then asked to give a maturity rating to the Campaign Loading process. She gave in a rating of 4.

Table 4.6 Process 2 – Maturity Rating by Participant

Maturity Rating	4
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From the explanation of the Capability Maturity Model given to her, she saw the campaign process at a Predictable maturity level. This means the process has achieved a level beyond well-defined but rather now it is an established process that operates within defined limits. The participant has also made some suggestions on how the maturity level could be brought closer to a more optimised level.

She was then asked what in her opinion would be ways to improve the level of maturity for this process. One suggestion is in regards to the fact that currently they are not able to load two promotions at once on the same items without creating a conflict. If such promotions are loaded then customers get both. For example, if one promotion says 20% off and another says 30%, the customer ends up getting 50% off which is not the intended outcome. The participant also mentioned that they had recently received a system upgrade and that had led to better performance as far as the computer system was concerned. In other words, improved technology can improve process performance. Another part of campaign loading that could be improved is the way that ecommerce promotions are loaded. At the moment, due to technical issues, gift with purchases are not offered with online transactions. Overall, the process could be improved if those in charge of creating promotions are able to meet more closely the timeliness standards required to perform this task. When promotional changes are made at short notice, it slows down the process. The reason being that the team member who performs a second person check gets inundated with requests and is not able to be as thorough as one usually would be which could result in mistakes being made. If the second person check is not done in time, it slows the process for the participant which in turn slows down the loading of campaigns at the individual POS systems on a timely business. This goes onto adversely affect shop floor processes such as delayed customer service due staff having to perform price overrides which

requires store manager approval. The store managers in turn are affected as they need to go around the shop floor assisting staff when they could actually be performing other tasks that are critical to the business.

4.3 PROCESS 3 – END OF DAY

The end of day process involves cashing up of the tills. Here the sales operators tally up their cash registers and separate their floats and daily cash takings. This is done electronically on the cash registers. The process the researcher looks at is what happens in the back office after the cash registers have been closed. The office person receives electronic transfers on the back office POS Server. The electronic transfer is compared to the physical cash handed to the office person by the till operators. The office person accepts these transfers accordingly and then prepares a bank deposit report for the takings that are to be deposited into the bank account. Finally, the office person initiates an end of day script that resets all registers to 0, ready for entering the float the next day.

The participant holds a high school qualification and is an expert in this area and has been performing this task for several years. She is not familiar with ITIL or COBIT 5 but is aware of service level agreements.

4.3.1 Observation

Table 4.7 Process 3 - Observations

Number of Tasks	Verify and accept transfers. (1) Check branch status to see if all registers have been cashed up. (1) Balancing of cash takings and float. (1) Process Banking(1) Initiate End of Day (1) Total = 6
Time taken	17 minutes
Number of Distractions	System error (1) (Time – 2 minutes) Sales staff queries (5) (Time - 5 minutes)
Human Computer Interactions	Back Office server 1 application used
Human-Human Interaction	IT Helpdesk

	Sales Staff
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4.3.2 Effectiveness and Efficiency

The following table shows a calculation of the effectiveness and efficiency of the processes.

Table 4.8 Process 3 – Effectiveness and Efficiency

Effectiveness	$6/6 = 100\%$
Efficiency (Time)	$10/17 = 58.2\%$

All required tasks were completed therefore the process is undoubtedly effective. Time efficiency, however, is questionable. The entire process took 17 minutes to complete out of which seven minutes were to manage a system error message which had popped up while accepting transfers. The participant had to call the IT Helpdesk to report this error. The IT Helpdesk logged this issue and was able to resolve it at first contact. The whole call and resolution took two minutes. Another 5 minutes were claimed by shop floor staff who had confusion about what they needed to do. While these distractions are expected in the normal course of the business, it did have an impact on the efficiency of the process.

4.3.3 The Interview

The following is a summary of the interview that was conducted after the observation of the task was completed. The interview started with asking the participant to describe the end of day process. The participant was leaning towards describing the process from a physical perspective such as that till operators physically counted the cash and put in 2 bags; one for floats and the other for takings. This was valuable information but other questions were interjected so that the answers were related to what happens on the information system i.e. the Point of Sale system (POS). It was then gathered that the till operators essentially used pre-set functions on their respective registers to initiate an end session. Once initiated, the POS would ask them if they wanted to perform an EFTPOS settlement which they did. Next they separated their float and cash takings both on the register and physically. Once this is confirmed, the register is reset to a new session logon for the next day. In the back office server, a transfer amount matching that of cash takings appears. The office person, in this case the participant, verifies the physical cash amount with what has appeared on the transfers screen and then accepts the electronic transfer. This is done for all registers for the

store. In this case, the store branch has 10 registers. After accepting the transfers, cash and takings are balanced and then the participant prepares the documents for banking the cash takings for the day. The process involves counting cash again and entering the denomination on the POS Server. Once this is done, the participant clicks on the “End of Day” button which is an automated function. The action resets the status of the branch for a new day and prints out daily sales reports, variance reports and till totals among other reports.

After these actions, the participant was asked to identify any factors that slowed down the process for her. The first one she highlighted was that of a system glitch which resulted in a “system error” message popping up on her screen. Each time it happens, she has to call the helpdesk. The other factor was that she felt enough training was not provided to get used to the system and used to find the process confusing for a while. She mostly had on the job training and used to be slower performing her tasks during those times.

Towards the end of the interview, the participant was introduced to the CMMI assessment tool. She was told what the purpose of it was and a printout was given to her with a description. She was asked to give a maturity rating to the end of day process. She gave it a rating of 4.

Table 4.9 Process 3 – Maturity Rating by Participant

Maturity Rating	4 Predictable
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She saw the End of Day process as an established process which was operating within defined limits to achieve the business objective. She was then asked to provide suggestions on how this process could be brought up to an optimized level of maturity. Her main suggestion was that staff needed to be given more thorough training on using the system. She was then asked if this suggestion was followed through, would it have an impact on other parts of the business. She agreed that there would be an impact. As is the case, the support staff members from the head office do not train the store staff in this process. Rather, it is existing store staff that train all new team members. The inference here is that if existing staff members do not know the proper process, they are effectively training new users to follow incorrect procedures. This naturally will have an impact on the capability maturity and overall efficiency of the process. During the interview she had also mentioned an inherent system glitch that caused a “system error” message to randomly pop up. She was asked if fixing this glitch would

improve the process. She said it definitely would bring about an improvement but expected that it would possibly be quite expensive for the business. Her understanding is that the business was aware of the glitch in the system when it was purchased and had a work around to that error message.

4.4 PROCESS 4 – SECURITY ACCESS REQUEST – STORE LEVEL

This is a process for giving access to the Point of Sale system and the customer order creation system to the general sales people. It allows them to process sales and create customer orders for big ticket items. These systems are different to the ones used by people at the head office. In this process, a security request form is submitted, signed by the store manager. One of the IT team members then creates this access and emails the confirmation to the store manager.

The participant holds an IT Diploma and is experienced in providing second level IT support and is an expert in this area. He is familiar with ITIL but not IT audits. However, he is aware of the need for process improvement.

4.4.1 Observation

Participant X received a security access request form from a store. The form requested access for three sales people. The following tasks were performed during the observation:

Table 4.10 Process 4 - Observations

Number of Tasks	Logging of task on a ticketing system (1 task) Creating access to POS system for each staff member (3 tasks) Creating access to CSO (customer sales order) system for each staff member (3 tasks) Email to the store manager conforming account setup and passwords (1 task)
Time taken	8 minutes and 30 seconds
Number of Distractions	1 phone call (approximately 1 minute)

	Illegible writing (2 minutes)
Human Computer Interactions	ServiceDesk Plus Advance Retail Identify Admin (CSO) Microsoft Outlook Telephone
Human-Human Interaction	Store office administrator

Two distractions were identified while the participant was performing the tasks. In one instance, his phone rang. The phone call lasted 30 seconds. The second one was due to illegible writing on the form. One of the sales people's name wasn't clear so the participant had to call the store manager to confirm the correct spelling of the name. This took about 2 minutes. While processing the request, the participant looked at the request form and the computer system. On the computer system he was using four different applications: Call logging system, the application used to create access to POS Registers, application to create access to customer sales orders and email. Other interactions involved speaking to a person over the phone seeking clarifications.

4.4.2 Effectiveness and Efficiency

The following table shows a calculation of the effectiveness and efficiency of the processes.

Table 4.11 Process 4 – Effectiveness and Efficiency

Effectiveness	$8/8 = 100\%$
Efficiency (Time)	$6/8.5 = 70.6\%$

The process is successful in achieving its goal as it is a hundred per cent effective. However, effectiveness is affected due to interferences when trying to complete the task.

4.4.2 The Interview

The participant described the entire process of giving access to store staff the Point of Sale system and customer order creation system. Store security access form is received from stores so that new employees are able to log into the POS. The form includes the employee number and their first and last names and the type of account that they need to create for (for example, General Sales Person, Office Staff or Manager). The first application used is called ARProd (from Advance Retail). This is where the access to

log into POS is created. The next application is called Identity Admin where the ability to create customer sales orders for big ticket items is created. Once done, the username and password for both applications is emailed to the Assistant Store Manager who passes this information to the new employees.

When asked if there were any weaknesses in this process the participant advised that when the payroll department assigns employee IDs to new staff members, they send these IDs to the store managers who then complete a form for IT to grant access to relevant applications. The participant feels that it would be better for Payroll to send this information directly to IT as well so as to reduce the length of time taken to grant access. The other weakness identified is that access requests come in the form of paper forms. The staff members manually write the names of new team members and sometimes their writings are illegible. This results in having to call them up and try to find the correct spellings of names causing delays that could have been avoided.

The participant was then asked to discuss more on his suggestion that the payroll should send new employee information to IT people in the same way as when they send the information to the store managers. He was asked whether it was likely to have any impact on any part of the business. In his point of view, his suggestion would definitely make the process faster and more efficient and he didn't see any negative impact of applying his suggestion.

The COBIT 5 Capability Maturity Model was shown to the participant and the different levels of maturity were explained to him. The participant gave this process a maturity rating of 3-4.

Table 4.12 Process 4 – Maturity Rating by Participant

Maturity Rating	Between 3 to 4
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He sees the process as reasonably defined and capable of achieving the objectives and is approaching operation that is close to a predictable (Level 4) level. He stated that while the followed process was effective, there was room for much improvement. The participant identified a couple of flaws in the system. One was the use of paper forms that were used to submit IT requests which in turn led to the possibility of illegible writing on the forms. The other was the observation that there was a bit of double handling with this process. The current process is that once an employee is hired and allocated an employee number, the Human Resources (HR) team emails the Store Manager who then completes a request form and submits it to the Service Desk for

processing. Participant X stated that if HR were to simultaneously email the service desk when emailing the store manager, the need for the store manager to complete a request form could be completely eliminated and thus, making the process more efficient. Another suggestion by the Participant to improve the efficiency of the process is rather than using paper forms, the business should make use of web/electronic forms. This would not only save on paper costs but also avoid spelling errors as a result of illegibility of request forms.

4.7 CONCLUSION

This chapter 4 involved the collection and recording of data for three IT processes carried out in a retail environment with the means of observations and unstructured interviews. While there were several people who were interested to participate in this research but only four were included as they were the only ones relevant to the processes that are the focus of this research. As planned, the processes were first observed, followed by an unstructured interview that was followed by a discussion on the maturity level of each of the processes. The observations were presented in a tabular format while the calculations of effectiveness and efficiency were presented in a percentage format. The participants were also given the opportunity to highlight factors that negatively affected the efficiency of the processes. The maturity levels assessed by the participants were stated and discussed. Finally, the suggestions for improving the maturity levels were discussed.

The researcher now has enough data to proceed to the next step of analysis. Chapter 5 involves a thorough analysis of this data. The three main categories of analysis will be the weaknesses of the processes, the capability maturity of each of the processes and the recommendations and suggestions to improve the maturity level of IT processes. The conclusions drawn from literature review, has an essential contribution to the analysis performed in Chapter 5. The primary conclusion from literature review was that information security and business value among other factors can be enhanced through process improvement. The assertion refers to the improvement in the capability maturity of IT processes in businesses.

Chapter 5

Discussion of Findings

5.0 INTRODUCTION

Chapter 4 presented a report of findings which were collated as described in the methodology section in Chapter 3. The response to the invitation to participate in the research was greater than anticipated. The findings were presented in different ways and the transcripts can be found in the appendices. The data recorded from observations were presented in a tabular format and the unstructured interviews were presented in a descriptive format. The efficiency and effectiveness percentages were converted to percentages and presented in a table. Likewise, the maturity assessments by participants were presented as percentages in a table, and supported by a descriptive text on the reasons and recommendations for improvements. These findings allowed the researcher to determine how the maturity of IT processes in a retail business could be brought up to a higher level. Based on the data collected, a thorough review of capability maturity in the retail sector will be carried out to determine how IT Audits can be used to improve the efficiency of IT processes and ultimately add value to the business as a whole. The primary objective of Chapter 5 is to answer the main research question as well as the sub-questions and research hypotheses. In addition, the findings from Chapter 4 are discussed in relation to the maturity of IT processes as well as the conclusions drawn from the Literature Review in Chapter 2.

Chapter 5 consists of six sections. Section 5.1 is a discussion of the hypotheses tests for this this research, Section 5.2 is a discussion of the sub-questions for this research as well as answer to these questions, and Section 5.3 is a discussion on the empirical study of 3 IT security processes, answering the main research question from the data collected for 3 IT processes. Section 5.4 goes on to discuss their effectiveness, efficiency and maturity levels as well as the weaknesses in those process and how those processes could be improved. Section 5.5 highlights the limitations of this study including literature and data collection. Finally, section 5.6 presents a conclusion to chapter 5.

5.1 HYPOTHESIS TESTS

The purpose of this section is to test and evaluate the hypotheses developed in Chapter 3. The objective of this is to verify and validate the findings reported in Chapter 4.

This will also assist in answering the main research question. The data collected via the means of observations and interviews for the 3 different IT processes will be checked against the given hypotheses. The supporting and opposing points are evaluated in order to determine whether the hypotheses will be accepted, rejected or neither. The hypothesis tests are presented in the following tables 1-4.

Table 5.1: Hypothesis Test 1

Hypothesis 1: Improvement in technology can result in greater efficiency of processes.	
<p>Argument For:</p> <ul style="list-style-type: none"> ▪ Technological upgrades are brought about to improve the overall performance of the business. ▪ Upgrades are made so that businesses don't end up with obsolete systems for which support is no longer available. ▪ Improved technology is based on best practices which are of benefit for the business. ▪ It allows businesses to maintain a competitive edge. ▪ This also allows staff to upgrade their skillset as they learn to use new technology and processes. 	<p>Argument Against:</p> <ul style="list-style-type: none"> ▪ Difficulty in adapting to new systems and procedures. ▪ Resistance to change. ▪ Lower staff morale as they struggle to learn. ▪ Lower productivity when staff members are unable to adapt to new technology.
<p>Discussion:</p> <p>Technological upgrades are brought about to further enhance the IT capability of a businesses. As pointed out, the reason for upgrades are numerous. For one, technology tends to become obsolete and eventually has little or no support available. In such a case, if some system issues arise the process will be at a halt due to lack of support. In the rare cases where support is actually available for outdated technology, it becomes expensive for businesses to continue to use this support rather than upgrading. From a different perspective, it is understandable that normally there is a lot of resistance to change. Many staff members are too comfortable with existing processes and find it very difficult to learn new systems and procedures. However, with the right kind of training and through management commitment</p>	

and support these challenges can be effectively overcome. It must also be impressed onto staff how new technology benefits the company as well as their personal development by learning new skills. From the data collected from the participant who performs the Campaign Loading Process, it was gathered that there had recently been a system upgrade which had made performing her task a whole lot faster. The participants who performed the Security Access Process have in fact recommended improvements in technology. They indicated that if instead of using paper request forms, online forms were used, their tasks would be more efficient. Likewise, the participant who performs the End of Day task indicated that upgrading the Point Of Sale would get rid of some system glitches and thus makes the process more efficient. Therefore, it can be concluded that in practical terms, improvement in technology can lead to greater efficiency in IT processes. Thus, this hypothesis is accepted.

Table 5.2: Hypothesis Test 2

Hypothesis 2: Most IT processes are performing at an optimum level.	
Arguments For: <ul style="list-style-type: none"> ▪ The processes are effective. ▪ Staff members are experienced in performing their tasks. ▪ Staff members know what to do in the case of errors. ▪ There is support available. 	Arguments Against: <ul style="list-style-type: none"> ▪ There is always room for improvement. ▪ Business specific practices are not necessarily industry best practices. ▪ The process of improvements is on-going; therefore claiming optimum performance may be redundant. ▪ There are also some staff members who do not always know what to do.
Discussion: <p>From the data collected through observations and interviews, it is clear that there is an established and predictable process in place for each of the areas of interest. The processes are effective in achieving the goals of the business segment. However, the participants have indicated that there is always room for improvements. They accept that the processes are effective but clearly not best practices. The fact that they have made suggestions makes it quite obvious that the processes are not at an optimum level yet. Therefore, this hypothesis is rejected.</p>	

Table 5.3: Hypothesis Test 3

Hypothesis 3: Resistance to change can deter the effectiveness of best practice frameworks.	
Arguments For: <ul style="list-style-type: none">▪ Lower productivity.▪ Question of competency on staff and management.▪ Tasks not performed effectively.▪ Loss of overall business value.	Arguments Against: <ul style="list-style-type: none">▪ Staff members continue to perform the tasks whether they like the new processes or not.
Discussion: <p>Based on the evidence gathered from literature review, the implementation of a best practice framework such as ITIL will be unsuccessful if there is resistance to change. This is particularly true when it is actually management that does not show its commitment and enthusiasm for the benefits that will be reaped from implementing a best practice framework. The result of resistance is that employees will not be performing their tasks to the best of their abilities. This could be a result of insufficient training or simply a natural reflex to new ideas. Management motivation plays a huge role in this situation as well. Resistance means that there will be a breakdown between the goals of the business and may no longer be effectively achieved. Hence, it holds true that resistance to change does in fact deter the effectiveness of best practice frameworks. Thus, this hypothesis is accepted.</p>	

Table 5.4: Hypothesis Test 4

Hypothesis 1 Staff education through training contributes to better performance of processes.	
Argument For: <ul style="list-style-type: none">▪ Motivation of staff by emphasis on personal development.▪ Opportunity for staff to learn new skills.▪ Staff learn why the process are formed.	Argument Against: <ul style="list-style-type: none">▪ Add costs for the business.▪ Resistance to change.▪ Slow learners.▪ Lack of effective leadership

<ul style="list-style-type: none"> ▪ Personal benefits are aligned with the business benefits. 	
<p>Discussion:</p> <p>It is true that staff training is an added cost for the business. However, investment in training renders long term benefits for the business. Structured training ensures that staff members learn and adapt to new systems effectively. Through the training process it is important to encourage staff feedback on how further improvements to the new system could be made. This will be very effective if senior management emphasises that training is not only beneficial to the company but to the staff as well. This will deal with those reluctant to be trained. Those that are slow learners can be encouraged and provided coaching to help with their training. Knowledgeable staff members are able to work smart rather than just working hard. The initiative brings about efficiency of process and eliminates double handling were possible. Three out of the four participants during data collection recommended the need for staff training. According to them, this is particularly important when people intend to make IT requests. The need to follow the proper channels when logging their requests. Breaking the process flow affects other processes and tasks negatively. Thus, staff needs to be trained to follow standard operating procedures which are developed in accordance with best practice frameworks. As such, this hypothesis is accepted.</p>	

5.2 SUB-QUESTIONS ANSWERED

This section of Chapter 5 seeks to answer the 5 sub-questions from Chapter 3 in order to answer the primary research question. The following 5 tables present each of the questions together with its answer as well as a summary of findings.

Table 5.5: Answer to Sub-Question 1

<p>Sub-Question 1:</p> <p>What is the capability maturity of existing IT processes?</p>
<p>Answer:</p> <p>The capability maturity rating for each IT process is different. Process 1 (Security Access Request – Support Office) has a maturity rating of 3 (Established). Process</p>

2 (Campaign Loading) has a maturity rating of 4 (Predictable). Process 3 (End of Day) has a maturity rating of 4 (Predictable). Process 4 (Security Access Request – Store Level) was given a maturity rating of 3.5 (Established to Predictable).

Summary:

There is a high level of diversity amongst the various IT processes within the retail business. From the ones selected for assessment, the minimum rating given to a process was 3, meaning Established. This means that there is a clearly defined process that has been implemented that allows the effective achievement of the intended goals. At best, the processes have a rating of 4 which is Predictable on the maturity model. The means processes are defined within a set boundary that allows the goals of the process to be achieved. It comprises of process management and process controls as its attributes.

Table 5.6: Answer to Sub-Question 2

Sub-Question 2:

How can COBIT 5 improve these processes?

Answer:

Using the CMMI tool from COBIT 5, the maturity of the existing processes is assessed. Once this assessment is completed to determine the level at which each process falls, it becomes easier for an analyst to determine what action to take in order to bring the maturity of the process to a higher level. The actions to be taken can be taken as recommendations from people who actually perform the processes as well as the industry best practices.

Summary:

The Capability Maturity Model Interface is used to perform an assessment on the current maturity of the existing processes. During the data collecting stage, the participants were asked to give a maturity rating to each of their respective processes. In doing so, they were able to identify the weaknesses in the processes as well as how these processes could be improved. During the course of the

interviews the participants were educated on the CMMI tool so that they too could understand and use this tool to improve processes.

Table 5.7: Answer to Sub-Question 3

Sub-Question 3: Does COBIT 5 enhance Information Security while improving service delivery?
Answer: Yes, it does.
Summary: Information security is all about protecting information from unauthorised access. Information security involves processes and as discovered in the course of literature review and data collection, processes can be improved and be taken up to a higher level of maturity. Improvements also come from adapting to best practices. Therefore, information security can definitely be enhanced using COBIT 5.

Table 5.8: Answer to Sub-Question 4

Sub-Question 4: What is the resistance level to change for IT staff?
Answer: There are generally some staff members who typically don't like change. However, in the case of the company studied, the resistance level is between low and moderate.
Summary: The data collected through interviews didn't specifically relate to resistance to change. The participants did appear to be quite open to change in the spirit of process improvement. From literature review however, some employees prefer not to change as they are quite complacent with the existing processes and feel that as

long as the goals are being achieved, they are quite happy. This is regardless of whether the processes are efficient or industry best practices.

Table 5.9: Answer to Sub-Question 5

Sub-Question 5: What are the compliance requirements in place?
Answer: Service Level Agreements. ITIL best practices. PCI Compliance. Compliance with IT Audit recommendations.
Summary: The IT department as a whole has a few rules in place. There is a service level agreement in place in regards to the amount of time each logged task should take to process. The principles of ITIL are followed to enhance the level of service delivery. The Audit department is particularly interested in promoting Payment Card Industry (PCI) compliance. This normally relates to the storage of credit card information and installation of new and replacement EFTPOS terminals.

5.3 RESEARCH QUESTION ANSWERED

The aim of this section is to answer the main research question which was developed in Chapter 3. The main research question regards: Security Control Framework Impacts in the Retail Sector and leads to the research question: What Value Can COBIT 5 Add to ITIL Adoption? The goal of this research is to select 3 IT processes in a retail business which uses the ITIL framework for service delivery and assess the capability maturity of these processes using CMMI from COBIT 5 and then determine how the maturity levels of these processes can be improved.

The research through a structured literature review allowed the researcher to understand the key concepts in the scope of this project. Chapter 2 defined risks and risk management as well as IT Management and IT Governance. IT Management focuses on the operational expectations of IT investment whereas IT Governance focuses on the strategic planning such that IT investment goals are in alignment with the overall business goals. There are two IT frameworks that are central to this research. With the aid of the literature review both these frameworks were defined;

COBIT 5 and ITIL. ITIL is a framework used by various types of businesses including retail. The gist of using this framework is to follow best practices when it comes to IT service delivery. The retail business being studied has already adopted this framework for its IT operations. In support of ITIL adoption, its various benefits have been identified and discussed in Chapter 2. These benefits make ITIL a clear choice for managers who want their IT departments to perform at maximum efficiency. In defining the other framework of interest, the researcher discovered that COBIT 5 is an esoteric framework that has numerous tools that can be applied to any business in conjunction with any existing frameworks such as ITIL. COBIT 5 is able to complement the existing framework and can be shown from the data. CMMI is the specific tool that was used to assess 3 IT processes in the retail business in Chapter 4. The IT processes being studied were already following the principles of ITIL. However, with COBIT 5 and more specifically the Capability Maturity Model Interface, the researcher was able to get the participants to make an assessment of the processes they were following. The participants also pointed out the factors that were making their performance less efficient and preventing them from fully performing their tasks. Moreover, they were able to determine changes and improvements which in turn could make the processes more efficient. In addition, introducing the participants to CMMI made them consider ways in which the processes could be improved. Further, they were able to consider the impact of implementing their recommendations on other segments of the business. This is an indication of the value adding ability of COBIT 5 which is after all, an integrated approach.

Thus, the value derived from COBIT 5 is that it increases the efficiency of processes. It does this by assessing the maturity level of the processes and identifying factors that cause the processes to be less than efficient. Being efficient means that tasks are performed on a timelier basis and redundant actions are done away with. Efficiency saves the business unnecessary operational costs and allows performance closer to an optimum level. Efficiency reflects better on the operations management team and ultimately, the stakeholders gain better returns on investment in IT resources. In addition, because employees are involved in such audits, they become better equipped to develop, understand and adapt to changes in processes for business improvement as a whole. Employees are further motivated through development as a result of employee up skilling. This means the employee turnover rate becomes lower

The data collected from the interviews have been divided into 5 different categories. These are process description, problems, solutions, recommendations for improvements and the impact of these improvements. The same titles have been given to the nodes in NVIVO. The relationship between the categories is systematic, meaning one leads to another. The sequence runs from a process which has problems, these problems have solutions which can bring about improvements and improvements in turn will have some form of impact on the business. Looking at the process description in each task observed the inference is that the participants know what they need to do and are effectively experts in the respective areas. It is in the area of problems that the researcher begins to see a common theme. A report was run in NVivo in regards to these problems. The following table shows the problems that participants have highlighted.

Table 5.10 Common Problems Identified

Problem Identified
Illegible writing
Not following processes
Not enough training
Not knowing the process
Failure to report issues
Potential resistance to change or learning new skills

These problems in essence are negatively affecting the processes from performing at a higher level. The common problems are associated with participants not knowing what to do, or not doing what they need to do as per the process requirements. The primary problem identified is that some staff members have not received enough appropriate training. Because of this, the processes followed are delayed through human error, inability to understand the process flow and not knowing what to do. For the campaign loading process in particular, it was identified that other participants in the process were not following the timeliness standards expected in the process and thus, deterring optimum performance. This ultimately affects the efficiency of

processes as a whole and then negatively affecting business performance as well. For example, where a process could be completed in the 10 minutes, it actually takes 17 minutes to complete. The problem defeats the purpose of using modern technology which intends to make life easier. Delays caused by the identified problems also affect the Service Level Agreements that a business has with its customers. The SLAs need to be viewed in an integrated fashion. Meaning that when a particular store person is delayed in performing their end of day processes, it in turn affects the tasks performed by the finance team. This in turn affects the accurate view of available finances, which in turn can lead to an inaccurate perception of cash flows and budgeting. Likewise, using paper forms for security access requests is firstly quite archaic seeming in this age of technology where digital forms can easily be created. Digital forms can ensure accuracy in typing, accurate approval by authorised and relevant managers. In addition, they provide a detailed audit trail. Furthermore, the use of paper forms also involved writing with a pen and resulted in illegible writing with spelling errors that occurred frequently. This could potentially result it sales staff not getting their correct performance stats due to their names not matching the records. The least damaging impact of this process is for the security access request processing person to call up store managers to verify spellings. Nonetheless, it still prevented the process from being efficient because calling up people takes extra time. The following table lists the solutions recommended by the participants. This relates to the node ‘Solutions to problems’ in NVivo. A report was run for this table and a table was generated from that report.

Table 5.11 Solutions

Solutions
Enhance technology – use of web forms
Increase knowledge on processes
Inform users of processes
Greater attention to service level agreements

To make the recommendations clearer they are listed in table 5.12. The reasoning provided shows that the solutions and suggestions for improvements are linked.

Table 5.12 Recommendations

Recommendations for Improvements
Better training and more through training of staff
Stick to processes
Timeliness Standards need to be followed
Better use of technology
Overall commitment to improvement of IT processes

One of the improvements identified relates to timeliness standards, particularly in the campaign loading process. The campaign is supposed to provide campaign data to the respondent two weeks in advance however they tend not to adhere to this requirement. Thus, creating unnecessary rush when the time comes to load campaigns. This also results in pressure on the person in charge of verifying accuracy of campaign data. The next recommendation for improvement is also related to the first one. The issue of not following the processes that are actually in place. Generally, the processes in place are best practices derived from the use of ITIL. The use of paper forms for security access requests is seen as unacceptable by the respondents and with good reason. Most businesses such as the business in question have their own internal development teams. Therefore, using their skills to develop electronic request forms would be an acceptable approach to improve processes. This, of course raises the issue of people not being able to use the web forms. To address the issue, the participants have actually made a fitting observation and recommendation. The fact is that staff are not trained to an acceptable level. For example, for the end of day process, the participant stated that neither she nor her colleagues had received sufficient training in the area of end of day processes.

Implementing the commendations made may also have negative and positive consequences. The following table shows the potential impacts of making changes to the process flow in the business.

Table 5.13 Impact of Implementing Recommendations

Impact of Improvements
Better trained staff
Better execution of processes
Improved efficiency in processes
Increased cost in training staff
Possible increased cost of technology upgrades
Savings on stationary

The impact of implementing these suggestions is mostly positive. Investing in training staff to better understand and follow IT processes is always a value adding move for the business. This leads to staff being better able to execute process improvement. The result is staff becoming more knowledgeable and proactive due to receiving effective training. This in turn, results in efficiency of processes meaning that because staff know the process thoroughly less time is spent in seeking clarifications and looking for someone who may know the process a little better. On the other hand, more training means more costs for the business. However, training and development of employees is a global trend so as to improve the performance of business operations. Therefore, it stands as a justification to why businesses should not be affected by this potential cost. All businesses need highly competent workers to remain competitive in in their relevant industry and market. Upgrades to technology can be quite expensive as well. However, once again, upgrades to technology are a norm and with businesses that have in house developers, the changes and upgrades can easily be developed.

The main conclusion drawn from these findings is that while the processes themselves are quite effective in meeting the intended outcomes, factors such as insufficient training, not following processes and not making full use of the technology, act as deterrents to optimum performance of processes. As discussed above, the processes in place are generally accepted best practices created using the principles of ITIL and have the potential to meet business goals at a high level. The use of the Capability Maturity Model Interface allows a focus on the more intricate details in these processes. The unstructured interview helped dissect the processes and

helped understand the problems related to the processes, the solutions to these problems and how these processes could be improved. The ways to improve these processes have been presented earlier.

When it comes to the maturity of the processes, all have the makings of effectively and efficiently achieving the outcomes for the business. They are eligible to get a rating of near 4. It is only due to the issues highlighted that the processes are not able to perform at an optimised level. The improvements that have been recommended, if implemented, will be able to enhance the performance of these processes and ultimately create greater value for the business.

5.5 LIMITATIONS OF STUDY

The inherent limitation to this research is the transfer to other contexts in the evaluation of the costs and benefits in these other contexts. The reason being that there are so many potential sources of data and variations between the use of IT in different business contexts. The process to attain the means to ethically extract data from these sources tends to be quite time consuming and an obstacle to larger survey studies, which may again meet considerable internal resistance. In a related area, the interviews conducted had to be kept within in time limits. This is because respondents tend to have a lot to say and these responses carry a lot of value. Conversely, sometimes the responses diverted from the theme of the research as a participant started discussing the physical process rather than the process on the system. This, together with time constraints of the interview requirement, was kept in check by controlling the track of the interview by asking questions that lead the respondents back to the areas of interest.

Another limitation relates to the selection of three IT processes in the retail sector which actually consists of thousands of IT processes. Each process is a vital part of the business. These can be anything from how a security guard operates the security equipment to how the CEO identifies and runs bottom-line reports. In order to overcome the limitation, the researcher identified areas where he had access to with the potential to more effectively recruit participants for the research. In this case, the IT processes selected were Security Access Request Processing, Campaign Loading and End of Day processing. In addition, the researcher faced some difficulties in determining the scope of the interview considering there is so much information available. Additional effort required to keep the interview on track as respondents tend to divert the discussion to other areas, meaning instead of discussing the IT processes

they start discussing the physical labour of counting cash and putting it in a bag and taking it over to another person. Finally, a limitation was to determine how much information would actually be enough information considering the amount of information that is available for retail businesses. This limitation was overcome by focusing on the main research question and then collecting enough relevant information to be able to draw conclusions. Clearly there is much more information that can be brought in the scope by using other questions and other data collection techniques.

5.6 CONCLUSION

This chapter was an analysis and a discussion of the findings from chapter 4 as well as chapter 2 which was a systematic literature review. The first section of this chapter 5 was concerned with carrying out the tests of hypotheses that were developed in Chapter 3 (Methodology). There were four hypotheses that were tested by discussing arguments for and against them. After this, the sub-questions of this research were answered, also supported by findings from data collection and literature review. The chapter then proceeded to answering the main research question. This section was successful in explaining the various ways in which value could be added to businesses as a result of using COBIT 5 for business improvement. To support the conclusions, a discussion was carried out on the findings from Chapter 4, in the section that followed.

Now that the research question has been answered, including the sub-questions and tests of hypotheses, this research can be brought to an end. The next chapter looks at recommending further research and further exploration of the research topic. It also looks at identifying the overall limitations of this research and opportunities for further research in the area.

Chapter 6

Conclusion

6.0 INTRODUCTION

Chapter 6 serves as a conclusion to the entire thesis based on the findings from Chapter 4 as well as the discussions from Chapter 5. The limitations and difficulties faced in the course of this research are also discussed in this chapter. Identification of limitations is quite important as it gives the reader an idea of the gaps in the research for IT audits, and helps pave the way for future research work to fill these gaps. It also allows for enhanced use of audit tools to conduct the audit of IT processes, and further automation development.

Chapter 6 also includes a summary of the research work carried out and a summary of findings (Section 6.1). In addition, based on the research outcomes and associated limitations, a discussion is made regarding the focus for future research work. This will serve as a guideline for others interested in in this area of IT control frameworks, and enable them to fill in the gaps in this research amongst others to create greater value for Information System Auditors.

6.1 SUMMARY OF RESEARCH

This research firstly involved a systematic literature review where key concepts relevant to the research were identified. It included thoroughly understanding what the two control frameworks consisted of and how they are implemented. These frameworks, COBIT 5 and ITIL, were defined and described, in terms of the benefits and costs of implementing these frameworks in a business. Other key concepts defined included risk, risk management, IT management, IT Governance and risk assessment. In addition, the main assessment tool was also defined. This is the Capability Maturity Model Interface from COBIT 5 which was used to assess the maturity of each of the three processes identified to be audited for this research. CMMI was key to the data collection process as it enabled the researcher to discuss the different maturity ratings given to the processes by research participants.

Data for this research was collected through observations and the means of unstructured interviews. The scope of data collection for this research was set within a business in the retail sector. Within the context, three IT processes were selected to be evaluated using a capability maturity model. While there were no specific questions

prepared for these interviews, it did start to follow a similar format for each participant where they were asked to describe the processes, the problems in the processes and ways to improve these processes. Once data was collected and collated it was presented in a tabular format to mainly give the effectiveness of the processes, the time efficiency of the processes, as well as a presentation of the capability maturity ratings. These ratings were then analysed compared to the effectiveness and efficiency percentages and a discussion followed to see whether the ratings given by the participants were generally appropriate. The NVIVO programme was used to analyse the interviews. Reports were run on the different nodes; problems, solutions and recommendations. The reports were then presented in a table that helped identify trends in each of the nodes. The analysis of findings also looked at the impact that recommendations could potentially have on the business, whether positive or negative.

The findings showed that the main problems that caused IT processes to not perform at the close of day to optimum levels, were; not committing to timeliness standards, not following the processes as prescribed, not making the best use of available technology (using paper forms instead of electronic forms), staff not having received enough training on some of the processes and generally not being able to stay to the Service Level Agreements for their specific processes. Several improvements were recommended to overcome the issue of not being able to attain a more appropriate level of efficiency. The distractions faced by the task performers were a few and improvements recommended had the potential to diminish most if not all the distractions. For example, in the case of verifying spellings of names because of illegible writing is a redundant task in this age of technology. The task of getting the correct names of staff can be attributed to the HR services who do the initial registration data entry for new staff members. It also highlighted the issue of following an unnecessarily long processes to grant access to employees; where HR sent information to store managers who then completed a security access request (on paper) and faxed it to the IT team to process. A more efficient processes identified by the participants was that HR should also forward the employee name and profile to IT who could simply create access for the employees based on the generic role profile. This way only special access requests would need to be completed by authorising managers. Apart from that, the recommendation to use web forms also has advantages as it removes the need to file the paper forms and having to verify that requests were approved by the authorised managers. These features can be set up so that a security

access request alert is automatically sent to the relevant manager to approve. Having an electronic system for the process also provides the benefits of creating an excellent audit trail which will be useful in investigating any unauthorised behaviours related to information security. The most critical issue however, was that some staff members were deemed not have received enough training to perform their tasks. For the End of Day task in particular, the participant indicated that she had not received sufficient training herself as well as other staff of the shop floor. Due to the problem, the efficiency of the process was affected. Looking at the efficiency percentage, it took a good while longer to complete the task than it would have if all staff had enough training and knew what to do. The technology was blamed in part for affecting efficiency as well. A participant indicated that an application (Point of Sale) contained some glitches that cause a system error to pop up. The staff members usually call the IT Helpdesk when this happens and the issue is resolved at the first level of response. However, due insufficient knowledge or training, some staff may not know that they need to call the Helpdesk to resolve this issue. Related to this problem, one participant indicated that sometimes staff did not report IT issues. The problem means that IT issues are not logged and that in turn means that if the people who can fix the problem do not know about the problem, will not be able to simply fix it because they are not aware of it.

After identifying the problems and determining the cause of the problems, ways of improvements were recommended by the participants. The primary suggestion was that staff needed to get enough training. The thought of training also brings concerns about the resistance to change concept identified in the literature review. These included staff not being competent enough, management not committing to change and not enough being done to promote the benefits to change. This is particularly true in the case of ITIL implementation. However, it needs to be noted that best practices in service delivery are derived from frameworks like ITIL and thus promoting change for the sake of best practices and greater value is very important. Another important recommendation was for staff to actually be able to follow the processes in place. One participant stated that, sometimes staff would come to him directly to resolve IT issues rather than following the appropriate channels to log an IT task first.

The recommendations made come with consequences as well. Some are positive while other may be viewed as negative. For example, training staff properly

is actually a benefit for business operations but there are costs involved that have to be managed and approved. Particularly considering that most businesses like their employees to be experienced and with the ability to do the work with little learning on the job. On the other hand, training and retaining high performing staff is the global trend and it would generally be unwise to choose not to train staff. It also needs to be considered that higher skilled staff can add greater value to the processes. Another recommendation was to resolve system glitches. This can be an expensive exercise for the business. The participant had identified that the business purchased software quite aware of the glitches and that these glitches were resolved overtime whenever a revised version of the software became available.

In summary, the following conclusions were drawn from data collection:

- There is always room to improve
- IT issues need to be vigilantly reported to resolve
- It is important to follow processes that are in place
- Processes need to be continuously evaluated and refined
- Businesses need to make best use of available technology
- As new upgrades come along businesses should proactively look to adopting them
- Staff and management need to promote and commit to training and development

A final conclusion drawn was that sometimes a business may have the most effective and efficient processes in place but it still fails to achieve optimum performance because people do not adhere to the processes and too many distracting factors further deviate the process from achieving the expected goals.

6.2 LIMITATIONS OF RESEARCH

Initially it was stated that there was not a lot of research done in the area of ITIL adoption for the retail sector. The research work that was carried out mainly concerns the benefits of ITIL and other similar control frameworks as well as the challenges associated with trying to implement such frameworks. Likewise, other research work was carried on COBIT 5 and how it could be used to improve the performance of business processes and eventually lead to an overall operation efficiency in business operations. However, there were not any specific research works to be focusing on IT

processes in the retail sector. Thus, this research was conducted to fill the gaps in this area of publication.

Several limitations were faced as the research progressed. Firstly, it was necessary to identify a suitable retail business that was willing to participate in the research. Once identified, the businesses had to be convinced that this was an open research and would not have any sensitive or confidential information, and was in fact an open research project. It needs to be noted that use of confidential information anonymously would have given greater insight into business improvements. So while excellent conclusions were successfully drawn from the data collected, a specific monetary figure could not be generated to suggest exactly how much value would be created for this business. Likewise, it wasn't possible calculate the potential costs of implementing recommendations made by research participants. Therein lay a limitation in this research. Another limitation was related to the vast number of IT processes carried out within a retail business. The challenge lay in identifying three processes that the researcher could understand and evaluate. The reason this was challenging was that all processes in a business can be deemed equally important. The reason for only selecting the three processes was due to the time factor as it would have taken a long time to invite and then interview participants for each process, in addition to the analysing and collating results from these interviews. Another limitation related to time was that, interviews conducted with participants had to be done in a controlled manner. Due to the unstructured nature of the interviews, participants tended to detract to other areas of improvement. While this was valuable information, interviews had to be redirected to focus on problems and improvements.

Yet another limitation was that with some of the participants, there were actual distractions during the interview. For example for one participant, her phone started ringing and that may have had an impact on the quality of information she provided. Other factors that affected, the quality of responses included people walking by the interview room, various noises and the time of the day seemed to have some effect as well. This may have been related to workload or simply the need to take a break.

Moreover, the participants may not have understood the full value of the audit tool used for capability maturity assessment; CMMI. While reasonable effort was made to educate the participants on this tool through verbal and written material, the participants may have just seen this tool as a regular scale where people list their preferences from 1 to 10. So while the scale was similar, for CMMI, each level had a

specific definition. Nonetheless, good information was still collected from the participants. In any case, these limitations and gaps highlight opportunities for future research in this area.

6.3 FUTURE RESEARCH

In this research, the data was only collected for three IT processes in a retail business. The interviews were conducted in a controlled manner. The interview itself was recorded on a voice recording device. For future works, more IT processes can be selected. The observations of the processes could also include video recording as the participants perform the tasks. This will allow for a greater quality of observational data and the researcher could then keep going back to verify what was recorded. Because there are so many interesting IT processes in the retail sector, more processes could be assessed in a similar research. It would be a good idea to have more researchers to share the workload of recruiting and interviewing participants. This would make the analysis stage easier as well.

Future research can also focus on cause and effect of changes in one process on other related processes. For example, in this research a recommendation was made that the Human Resources team should forward employee ID, Name and Role Profile to IT as well as the store managers so that IT would create security accesses based on generic role profiles. Thus, a future research project could look in greater depth at the human resource policies that dictate employee profiles and whether there would be any repercussions if HR were to follow the given recommendations. Further, the research could look at the impact on the store manager as well.

Another direction a research on IT audits could go is to study corporate social responsibility. This idea came into being when a participant in this research suggested that if the business chose to use electronic forms instead of paper forms, the business would not only save on stationery costs but also save trees. The suggestions actually creates a pathway to studying corporate social responsibility towards the environment. Such a study could identify IT processes that directly affect the environment. For example, these studies could focus on energy usage, disposal and recycling of equipment. An assessment could be performed on the efficiency of the process carried out in these areas to see how the social responsibilities of retail businesses could be enhanced, and as well continue to create value in business processes.

Another area of research that the researcher feels would be useful for future research is the use of Audit legislation. There has been legislation introduced as a result of the collapse of corporate giants such as Enron. While the target of these were accountants and auditors for financial processes there was a trickle-down effect on IT as well. One such legislation was the US Sarbanes-Oxley Act which also looks at the audit of IT process, how data is stored and accessed. Therefore, a research project could investigate how the Sarbanes-Oxley Act affects IT processes in the retail sector.

The area of IT Audits is very interesting as it involves looking at the audit trails of processes. As processes are improved, the specific trends to look at within the audit trail also changes. The main concern for IT audits is primarily about authentication and authorisation to access information. It is also about providing support to all other areas of the business. Since businesses work with the basic intention of making profits, IT supports this intention by facilitating business processes with the use of modern technology. Traditionally, IT was not seen as a value adding component in businesses but now it is seen for the competitive edge that it provides to businesses. One way it adds value to business is by continuously improving processes. As such, it is necessary to do more research that promotes continuous improvement for business IT processes.

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APPENDICES

A - Ethics Approval



AUTEC Secretariat

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10 November 2016

Brian Cusack
Faculty of Design and Creative Technologies

Dear Brian

Re Ethics Application: **16/373 Assessing control framework impact in the retail sector: What value can COBIT 5 add to ITIL adoption**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 9 November 2019.

As part of the ethics approval process, you are required to submit the following to AUTEC:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 9 November 2019;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>. This report is to be submitted either when the approval expires on 9 November 2019 or on completion of the project.

It is a condition of approval that AUTEC is notified of any adverse events or if the research does not commence. AUTEC approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTEC grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,

Kate O'Connor
Executive Secretary
Auckland University of Technology Ethics Committee

Cc: vishal_c_lal@yahoo.com

Appendix B
Interview Transcripts

Process 1: Security Access Request (Store Level)

Researcher: Can you explain the process you just followed?

Participant: Ok. So the process starts when we receive a store security access request form. It is a form sent by store managers to create new accounts for new employees so that they can log onto their computer or point of sale (POS). The form will have the employee number, name and the kind of account they need. So we go into the system called ARProd and create an account for them access the point of sale and another account called CSO. This is for customer orders for big ticket items. Then we email the assistant store manager or the store manager with the usernames and the passwords.

Researcher: OK. Thanks for that. In this process do you think there are any weaknesses that might delay the process that you follow or slow you down in some way?

Participant: OK. Although user IDs come from payroll, they are sent to the store managers. I think they should also just send it to us as well. That can cut time there. Then number 2 is that the request comes in paper form to print out. And they are not typing in the names. They are writing using their hands. So at times they might not be legible due to bad hand writing. Like in this case, I had to call the store manager to verify the username. So that was one phone call away.

Researcher: So just about payroll send an email directly. Do you think it will affect any other part of the business if they decided to email you together with the store with the employee details?

Participant: Not really. But from my point of view it will actually quicken the process. What I mean is suppose that the store manager is sent an email for an employee number and for some reason the manager is in a meeting. He won't be able to send it. But if the information was sent to the both of us, the moment we receive the information we will be able to create it straight away.

Researcher: That's great. Now, I would like to hand you an assessment form to assess the capability maturity of the process you just followed. Based on the process you just followed, how would you rate the maturity of the process?

Participant: I think I will place it between 3 and 4. Reason being, like I said before, forms should be sent to us electronically, typing in the details. We respond faster as

well. We wouldn't need to clarify the spellings of names etc. There's always room for improvement.

Researcher: Thanks for those interesting insights.

Process 2 – End of Day

Researcher: Can you describe for me the process that you followed?

Participant: Alright. At the end of the day what normally happens is we would do end session on a register, on each register. The money is then taken out of the register and put into a bag and taken to the office. There is an end of day process that happens in the back office. The money then gets locked up in the safe for whoever to do the banking the next day. So the end of day process will run through. And reports will then print off.

Researcher: what is the process on the system that you perform in the back office?

Participant: In the back office, it is pretty easy. There is a back office application where you would select the icon to run the process. It is all automatically set up so once you select that icon it will ask you whether there are any registers that haven't done an end session. You can either ignore it or choose to go to the specific register to see what has happened. Sometimes there are problems with certain registers that can't do end session on it. You will find out and proceed from there.

Researcher: Before you did the end of day, I noticed some amounts that appeared on your screen and you were accepting them. How does that work?

Participant: Once you have done an end session on the register it actually sends the transfer amount to the back office. So once they...that amount goes to the back office, you physically count the cash to make sure that the correct amount is there for you to accept in the back office. Because that needs to be accounted for the next day. So you need to accept the transfers in the office and then lock it away.

Researcher: And then on the system after accepting the transfers what's the next step that you do? Is it banking?

Participant: Normally, the banking is done in the morning. The process is different for different branches.

Researcher: What are some of the problems you may face or distractions that delay you performing the end of day process including accepting transfers and banking? So what are some of the distractions?

Participant: Like I mentioned before, there can be a problem on a specific register where it hasn't updated the transactions for the day and therefore doesn't allow you to

do end session. Sometimes it comes up with an error. What needs to be done? Normally if there is a problem, we can either restart the register or update the transaction server on that register. Sometime it doesn't work. But then you can leave that specific register for the next day.

Researcher: Are there any human errors?

Participant: Human errors occur when they put the.... End session screen. There are 2 columns, one for float and one for takings. Sometimes they swap the columns around. That affects the transfer amount that goes to the back office. It's not such a biggie because you can alter what you accept in the back office.

Researcher: While there do the registers have any program errors?

Participant: They do come up with system errors. If another register is actioning the exact same thing that the next register is doing then we get a dead lock error.

Researcher: What do you normally do when a system error message pops up?

Participant: I would contact the IT helpdesk. The remotely connect to the computer and help.

Researcher: Please rate this process in regards to its maturity level based on the tool that I have just given to you.

Participant: Let me have a look. I would rate it a 4.

Researcher: Do you think this process could be improved further.

Participant: I am new to this branch so I would say that regards to my training, it was minimal training. I only got to watch someone do their job while I was training. So things weren't explained to me properly. And there are a lot of things that I find out as I go along. So I would say there isn't proper training being done in stores.

Researcher: Would you say it includes the staff who close the tills as well.

Participant: Yes definitely because at the end of the day even though they have dedicated people doing that sometimes those people are not available. Anyone can just be asked to do it. Obviously, under supervision from the loss prevention. The person doing end session may not know what to do so they would call the helpdesk.

Researcher: Regarding the system bugs you mentioned earlier, would removing them make your work easier as well?

Participant: Yes. So besides the one with system error that was happening on POS, there are also error messages in the back office. Unless the stores communicate this to the helpdesk it won't get fixed. A lot of the times, the problem is at store level that doesn't get communicated to the helpdesk for IT to fix the problems. So it will definitely help a lot if it is all fixed because it creates more confusion if there's an error.

Researcher: While we are on system bugs, I assume it pretty much affects the whole brand. So if the business were trying to fix that bug do you think that will be too costly for the company.

Participant: Yes. The thing is that a lot of the system bugs. It's the onus of the company to fix it because they buy the product from the service provider. It is in their contract maybe to try and fix things. It's just that the service provider also has other clients and depends on who they consider more urgent. Sometimes it does take a while for bugs to be fixed.

Researcher: Improvements if there was better training. If the company were to train people more for longer, do you think that would affect other business segments?

Participant: It will definitely because it will maybe mean that they will have to. It's basically they can't go to each store to train people. It will mean that they will have to get a group of people to come to the head office to be trained. There will be travelling costs and finance will be affected.

Researcher: Thanks for that. You have given me a lot of useful information.

Process 3 – Security Access Request (Support Office)

Researcher: Thanks for that. Can you describe for me the process that you just followed?

Participant: Ok. This is a MAC form which stands for Move/Add/Changes form. Normally it is sent through when extra accesses or removals are required. So for this one, I first need to see if the form is completed with the user's name and if there is required by date and if it was approved by the appropriate manager. Then I look in detail at the form to see if I can understand what they wrote on the form. And that the right person requested those accesses. Everything is well then I will grant them the accesses required from the form. Afterwards I will send an email to the manager or requester that it has been completed. Then I will file this form.

Researcher: Now tell me if there are any elements that delay the process that you follow.

Participant: Sometimes it could be. For example when the requirements on the request aren't very clear or when there is a lot of backlog of work to be done. This could be improved. At the moment the requests come through on paper. People write on it. Sometimes their handwritings are not very clear. In my opinion it could be improved by designing a tool such as a website so that this requests come through online on the system. So they save on the paper.

Researcher: Anything else?

Participant: Not much.

Researcher: And are there any other external things that prevent you completing your task on time. Any distractions that you get?

Participant: Yes I do. Sometimes, like say that every time there is an issue they need to log a call. But there are still people come through directly to us. Because we are in the same office, they come to us and wave at us and say can you do this for me which is not following the process? That interrupts my work as well.

Researcher: Do you think there are other team members who could do something to help you?

Participant: Yes. I assume everyone could just keep on doing customer education so that they understand why they need to log a call with the helpdesk. So everyone gets

their priority when we do our work. Some of them could be more urgent. For example, replacing a faulty keyboard.

Researcher: Do you usually have a Service Level Agreement (SLA) for such requests?

Participant: Well there are. Normally for those ones there are a requirement for each of the requests. Like 4 or 5 days. Even 10 days. For some special ones there is an agreed on due date. So it all depends on what the problem is.

Researcher: And the tools that you use to complete this task how well are they working for you?

Participant: They are alright. Most of them are within the Active Directory. It's very standardised and easy to use.

Researcher: Now I am about to give you a tool called the Capability Maturity Model. On a scale from 1 to 5, how would you rate the maturity of this process?

Participant: I think I will give it a 3 based on those things that I just said now. It's a good process but there is room to improve. If they focus on this more, they can make it better.

Researcher: You did suggest earlier that there should be web forms to complete for such tasks. So let's say there was a way to make this happen. Do you think it will affect any other part of the business?

Participant: Yes it will. At the beginning it does require quite a lot of input from all the team members. And end users just need to take their time to understand and learn how to use the new tool. But after all, it could save the business quite a bit of money. Say for example, paper and ink when printing out the forms and running around to find a manager to sign it. If all this could be done on line then they can save a lot of money and time as well.

Researcher: And the requestors, do you think they will have any difficulty in using a web form instead of the paper form?

Participant: No. I would assume yes as whenever change comes there are lot of difficulties when you try to implement. There are people who are not so good with computers. So they tend to pick up quite slow than others. But this can be worked around by making sure that we generate a good guideline with pictures and even

videos included for step by step requests. To show them what to do. And eventually I think we will meet the target.

Researcher: And if we are looking at developing such a web system do you think it is going to be too costly for the business?

Participant: Some of these things have been done before in my previous experience. It first looks like it might cost a lot compared to the money they spend on consumables such as papers. In the long run that will be the trend because people are only seeing the money in buying the papers and toners. But they don't see cost of storing those and file those files. And that's something that is also not measurable. And this could actually save more money in the long run. And thinking about the environment, we will be using less paper.

Researcher: Is there anything else you would like to add to that?

Participant: That is pretty much it. This is a good process to follow. It gets things done to meet user expectations. With all those room for improvements, don't expect it to happen in a short period of time. It has to come from management in the long run.

Researcher: Thanks for that Participant. You have been very helpful.

Process 4 – Campaign Loading

Researcher: Can you explain for me the process that you followed?

Participant: Sure. So initially I will create a folder for people to put their promotions within 2 weeks before they need to be loaded. Afterwards, I will have a set date when I will unravel the information from those folders and start converting it into a CSV file. And from there once the CSV file is created I will check a number of things like the dates are correct even if. The spelling. If the offers are for store only or web only or both. So that promotion on ecommerce is the same as what is on the production sheet. After this I will send this information to Scott or Adam. They will check just in case I miss anything. They will come back and confirm or deny and say we need to do this or this doesn't look right. And then once that has been sorted I will just load the file only onto biztalk for the POS (Point of Sale) system and another one for the web system. For the web system you have an extra step in which you have to make sure that when you do a check for any of the web articles you are a little outside the parameters. Some of the Farmers stuff. They create articles and put them in after it and that is just for the photographs. This has to be done before the web file is sent out. Pretty much when you wait for the actual system to come back saying that the file has gone through. And that's it pretty much.

Researcher: What are some of the things that delay you or make the task a bit difficult for you to complete?

Participant: Normally the main delays are when we convert a file and start checking for mistakes and correct information. Maybe putting things like the information says 20% but the actual information maybe 50% off. Sometimes the promotion names don't look right. You may want to check the spelling. To determine if it is the true name. The dates different to the promotions. So you might have a promotion that might start on the 30th of March and finish on the 5th of April. But within the promotion you might have something that starts on the 28th. You will need to check if it is a mistake or is actually part of the promotion and they just have just decided this. In general, sometimes one of the biggest issues is people not following proper instructions. Because we want everything to be same or very similar. People just changing the way they do wording. Example 30% off menswear is menswear 30% off. So little bits and pieces. That is just human error. So generally when I check the files I will make a list and send it to the planners.

Researcher: Do people usually make changes in campaigns and how does that affect you?

Participant: So once a file is loaded if they make changes to the any of the advertising then that means you have to reload that file. So you have to create... go through the same process again but also you have to go back and delete what you have already created and put through the system. So in the web and also on the back of AR (Advance Retail) you literally have to go one by one for each of the promotional headers but date everything. So the changing promotions creates a lot of work.

Researcher: So if people change their minds about promotions does that lead to increase in errors or something?

Participant: Sometimes it's human error. A lot of times it's managers or buyers changing their minds about promotions because last week's sales were not that good. SO they want to change it. Or reacting to competition and advertising. That creates...literally is double the amount of work. And you have to be incredibly careful. Especially on the web. If you leave a promotion and load a new promotion they will get both. For example 20% on business jackets and then I load a new file with 20% off, customers will get 40% off business jackets .

Researcher: Apart from people changing their minds, how about the computer system, the way it runs. Do you get any delays?

Participant: Not generally. We have changed to the new server. It's pretty good most of the time. There's very few times where there's issues within the system for me. So that's not really an issue.

Researcher: Based on what we have discussed. I am about to give you an assessment tool. How would you rate the maturity of this process on a scale from 1 to 5?

Participant: I will say that it is around 4. It can always be improved. Just because of technology, the system works really well.

Researcher: If we were to further improve it, what are some suggestion that you would make?

Participant: It is really hard to know because with the promotions there are always trying to do thin properly. The ability to put through more complicated promotions. For example, we cannot do certain things like gift with purchase on the website. Obviously we can do it at store level. When buy this and this and you get this. All

these things for this price, it's difficult. You cannot really do it. Then you have to do a code 8 (Manual change) to get the offer.

Researcher: So in this case one promotion overrides the other?

Participant: Yes.

Researcher: Anything else?

Participant: Within the system. If we work with it. We can get more promotions to work than we do. Especially on the web which is more limited. Because the issues of gift with purchase. But I think it really works well.

Researcher: Thinking about when people are late when handing you the data that you need, would you have something to say in that area?

Participant: On my side, pretty much people not obviously passing information to me. But that doesn't just affect me, it affects them. Because this is their promotion in the sense that the longer they take to give it to me the harder it is going to be for me. It will be urgent for me to put it through in a timely manner. It is so much more difficult for Eddy because Eddy has to actually check the tickets against the promotions. So if something is done the day before the promotion, it gives him hardly any time to be able to check everything. So you know, mine is literally the first step to load what they give me. Eddy is the guardian of the gate. Looks at what I have loaded on POS, what I have loaded on AR and what do the tickets say. And puts it all together, and says you are missing this articles from the sofa, the tickets from the sofa. Or this is completely missing or I have to take this off the promotion. He's the one that can make sure. It's a really hard job. It's really massive.

Researcher: Thanks for that. That is a lot of useful information for me.