Analysis of existing accounting information systems (AIS) to develop a framework for a real-time management accounting system in the School of Human and Life Sciences at Canterbury Christ Church University

By

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Year
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This thesis is dedicated to
my lovely wife Jessica and
my son Nelson
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Abstract

The current world is living on technology and no doubt, management accounting systems need technology to improve and enhance its functionality. Technology, competition and the pace of business are changing the way in which companies think about internal management information as the provision of real-time data could give large organisations such as universities a competitive edge.

This research helps to understand the need for managers to have real-time financial data available to enhance budget decisions as well as reduce administrative labour. Thus, after an analysis of existing accounting information systems (AIS) a framework for a real-time management accounting system will be developed.

By adopting a new management accounting system, it would allow the university managers and budget holders to effectively manage the financial and optimize resources management and also ensure better record keeping and preventing financial risks.
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List of Abbreviations

AIS - Accounting Information Systems
IT - Information Technology
CCCU - Canterbury Christ Church University
SMA - Strategic Management Accounting
CIMA - Chartered Institute of Management Accountants
ACCA - Association of Chartered Certified Accountants
MAS - Management Accounting Systems
MIS - Management Information Systems
DFD - Data flow diagrams
IFRS - International Financial Reporting Standards
RTA - Real-Time Accounting
IoT - Internet of Things
ERP - Enterprise Resource Planning
BPM - Business Process Models
BPMN - Business Process Modeling Notation
UML - Unified Modeling Language
**Research Aim:**
An analysis of existing accounting information systems (AIS) to develop a framework for a real-time management accounting system in the School of Human and Life Sciences at Canterbury Christ Church University

**Research Objectives:**
- To analyse the existing accounting information systems
- To understand the need for managers (Directors/Head of Schools) to have real time financial data available to enhance budget decisions as well as reduce administrative labour
- To develop a framework to model real-time management accounting system
Chapter 1

INTRODUCTION

1.1. Background

As we are experiencing rapid economic changes, keeping accurate records is extremely important in the accounting world. Over the last few decades, management accounting has been continually changing, getting increasingly complex. New financial rules, the globalisation of education as well as the growth of international electronic commerce, have collectively brought new challenges within the finance discipline. Also, as competition increases, businesses have to reduce their costs in order to continue their existence and in these very fast changing times, employers are actively looking for methods to improve the efficiency and profitability of their performance.

Today, organizations are confronting unprecedented radical changes and increasing challenges to which they must adapt in order to survive and prosper. The developments in information technologies have significantly changed work environments and the management of businesses. The business environment has become more dynamic and competitive, and it has become essential for managers to have up-to-date and real-time financial data available to enhance budget decisions, make strategic decisions as well as reduce administrative labour.

The importance of innovative management accounting information systems has increased as they could not only reduce costs, but also enable a much easier and more effective supervision of financial matters. However, as IT is rapidly developing, management accounting systems might not support the business properly, influencing the need to analyse the compatibility of current management accounting information system with the business environment, to successfully address these challenges. In the aspect of accounting, thanks to latest developing technologies, it is possible to record, transfer and store documents electronically, which cannot only reduce costs, but also, enable a much easier and more effective supervision of financial matters.
Within the university context, there has been a public outcry in recent years for better accountability of resources used within higher education due to rising costs and the increase in university tuition fees. Recent development of new financial software in university systems, has been greatly changing and improving the way finances are managed with the aim to perfect management systems and to prevent financial risks. Nevertheless, the lack of flexibility, consistency and frequency, as well as the frustration and confusion associated with the several processes within the university financial system, has raised several challenges for management. University managers (Head of Schools and Directors) for example, make timely and effective decisions for controlling, planning and directing expenditure and activity, based on the data available to them. With the levels of financial information and computer technology rising, current management accounting systems in the university sector have to reform in response to this new challenge. Perhaps, it could be argued that, they might require a real-time management accounting system to monitor the expenses incurred and remaining funds, by generating reports with a breakdown of the spending at any time requested.

The absence of a suitable management accounting system could be a serious gap in the university sector. In particular, at Canterbury Christ Church University, a new management accounting system is urgently required in order to enhance budget decisions processes and minimise inefficiencies and discrepancy within the monthly management accounts reports. Thus, this paper will analyse existing accounting information systems and also explore the integration of a framework for a real-time management accounting system in the School of Human and Life Sciences at CCCU.
Chapter 2

LITERATURE REVIEW AND THEORETICAL BACKGROUND

In order to investigate the previously mentioned research aim and objectives (see page 9), one should better understand the gap between the theory and practice in accounting information system, and the characteristics of the business environment which may influence this gap. Thus, the first section of this research provides an overview on the analysis of different theories and concepts of the impact of Information Technology (IT) and the challenge of the real-time reporting on AIS in large organisations such as universities. The review will subsequently move on to discuss the research methodology used for generating the data necessary to obtain answers to the research objectives.

2.1. The impact of IT on accounting information systems

According to Ghasemi (2011, p. 112) “IT is the area of managing technology and spans a wide variety of areas that include but are not limited to things such as processes, computer software, information systems, computer hardware, programming languages, and data constructs.” Therefore, it might be argued that, anything that renders data, information or perceived knowledge in any multimedia distribution mechanism, is considered part of the domain space known as IT. IT can be a powerful tool that can play a big part in making a large organisation’s business a successful one. A few of the duties that IT perform may include data management, networking, engineering computer hardware, database and software design, as well as management and administration of entire systems (Connor & Martinsons, 2006).

According to Hall (2010), the main purpose of accounting is to provide information that is needed for sound economic decision making, be it of a financial nature or of a managerial one for internal purposes, but also for external decision making. In addition,
Sonnenberg & Brocke (2014) argue that, when one thinks about accounting functions, one is mainly thinking about a systematic and comprehensive recording of financial transactions as well as the process of summarizing, analysing and reporting these transactions which are important to the business. Hence, countless financial transactions from within a certain period are considered in order to process a statement that in turn summarizes a company's operations and its financial position.

While it seems to be widely acknowledged that IT plays an important role (and increasingly so) in the field of accounting, the relationships between IT and accounting, especially with regards to management accounting and control, has been studied relatively little, although the number of studies in the field seems to be increasing (Granlund, 2011). IT has influenced all business processes, and accounting is no exception to this. According to Saban (2012), accounting procedures have changed when different methods and procedures were developed electronically transferring all the financial data, previously recorded in books, into large electronic financial platforms. Yeh et al. (2012) argue that IT has changed the accounting function from information collection to the functions of control assessment, interpretation, and decision-making, enabling such advanced managerial accounting techniques. Furthermore, Sutton (2006) points out that, the relationship between IT and management accounting appears to be the most complex and unpredictable in the field of accounting information systems.

The biggest impact IT has made on accounting is the ability of companies to develop and use computerized systems to track and record financial transactions. Kloviene (2015) draws attention to the relationship between accounting and IT, claiming that the continuous changing, as well as the exclusive requirements of information, have encouraged the development and enhancement of accounting functions, methods and applications. Thus, it might be deduced that, in such a competitive environment, continuous developments in IT have transformed accounting information systems, into more competitive and dynamic systems that support managers to make logical, consistent and strategic decisions.

In addition, Guney (2014) also explores the impact that IT has had on accounting methods by claiming that in the last decade, technological developments have changed the way in which accounting tasks are conducted as they have gradually been managed through electronic media. Moreover, as claimed by Ferrer (2012), a computerised accounting
system enables managers to handle their finances more flexibly, efficiently, and affordably than ever before. In fact, it could be said that IT networks and computer systems have shortened the time needed by accountants to prepare and present financial information to management. Actually, this system allows individuals in large organisations to create individual reports in a quicker and easier way, to support management decision making.

According to Jeppesen and Frederiksen (2006, p. 45) “computer software aids connections between people, thereby providing solutions to financial problems and tools to carry out tasks. Thus, the use of software in accounting allows more effective knowledge management.” In addition, Duren (2000) highlights IT’s influence in accounting by noting that nowadays, software can enable us to record the smallest information unit at formation moment, which can help managers to access true and up-to-date information to base their decisions upon. Moreover, Guney (2014) emphasizes that almost all companies have started to keep their records through computerized accounting applications to improve their performance. Tickle et al. (2014) also note that due to the heavy use of software in the workplace, there could be significant improvements for accounting systems. It could, therefore, be deduced that the influence of computer software in accounting has prompted positive opinions about the enhancement in efficiency and profitability of management information systems in large organisations.

The application of IT in management accounting has been popular recently, as organisations found the importance of management accounting to their benefit which helps to accesses the organizations’ potentials. The management accounting professional bodies including the Chartered Institute of Management Accountants (CIMA) and the Association of Chartered Certified Accountants (ACCA) have stressed the importance of IT and emphasise that IT is the way forward to provide information to management for better decision-making approaches on budgets and real time processes (Moorthy, et al. 2012).

The role of management accounting is becoming more important in team-based organisations. The application of IT in management accounting is to provide some IT relevance in management accounting to improve the efficiency of decision-makers and to facilitate the management accounting information and render it accurate and error-free.
Management accounting measures and reports financial and non-financial information that helps managers make decisions to fulfil the goals of an organization (Horngren et al., 2000). According to Jain (2014) management accounting systems (MAS) is a term used to describe the accounting systems, methods, and techniques which combined with special knowledge, help managers with their tasks of minimizing losses and maximizing profits. Furthermore, Jain (2014) notes that as information is needed in the management functions of planning, controlling, directing operations and decision-making, then management accounting can be seen as a fundamental part of any organisation’s management information system (MIS). MAS and MIS are usually seen as systems that provide information to managers. They include reports, performance measurement systems, computerized information systems, such as executive information systems or management information systems, and also planning, budgeting and forecasting processes required to prepare and review managerial accounting information (Heidmann et al., 2008).

However, as Magdy (2011) claims, both in academic research and in management practice, the use of accounting information for management decision making and the impact of accounting in large organisational has dramatically changed. In recent years organisations are under pressure to manage complexity and reduce cost. Thus, the management accounting function can make major contributions to organisational effectiveness, and the developments of new management reporting systems to enhance organisational decision making, could include new insights that rely on better tools to more broadly evaluate organisational performance. However, Hemmer & Labro (2008) argue that upgrading management accounting systems to accommodate international accounting standards is a complex, costly, and time-consuming process, but once the required changes have been completed, the business benefits extend beyond International Financial Reporting Standards (IFRS) compliance.

An IT based management accounting system intends to provide information and insight to management and shareholders, who are in the position to decide budgets, investments and long-term planning. Thus, Sulaiman & Mitchell (2005) note that, in the last few decades the role of the management accounting function has changed with the impact of new technology and organisational changes, and also, it has experienced several innovative techniques and concepts such as strategic management accounting (SMA) and beyond budgeting in response to the new competitive environment. Thus, on the one hand
the strategic management accounting technique is best understood as a generic approach to accounting for strategic positioning (Carlsson-Wall & Kraus, 2014). However, on the other hand, the Beyond Budgeting concept enables organizations to react in an appropriate way and as quickly as possible to new chances and risks in the market environment (Daum, 2002). As it is claimed that the traditional system has lost relevance with the modern business environment and is no longer satisfying the needs of manager, the Beyond Budgeting has been proposed as an influential idea that will strengthen management accounting contribution in business performance and operation (Goode, 2011).

However, at present, having an efficient management accounting system is one of the main issues that universities face, thus it might be argued that a computerised real-time management accounting system could be a useful and valuable tool to enhance the finance administration and to meet the industry requirements for large organisations.

2.2. Accounting information systems: The challenge of the real-time reporting

Accounting has been defined as the process of identifying, measuring, recording and communicating economic information to permit informed judgments and economic decisions, in one word “Reporting” (Rom & Rohde, 2007). Thus, accounting reporting is traditionally the provision of relevant information covering monthly, quarterly and annual periods which supports subsequent financial decisions, and they may comprise significant different perspectives such as management accounting with its different functions such as forecasting, budgeting, costing and reporting on variances like cost control or detailed reports about performance against budget, as well as cash flow management (Arjaliës & Mundy, 2013)

Many economic events are now being captured, measured, recognized, and reported electronically, without any paper documentation. Online, real-time accounting (RTA) is emerging as the system of choice (Rezaee et al, 2000). A set of new possibilities of real-time reporting are thinkable by using the features of the actual computer systems. With computerized systems, real-time happens when input data is processed within milliseconds so that it is available immediately. Throughout the organisation’s life, the real-time reporting in accounting gives complete and instantaneous information about key
dimensions of the organization, allowing management to decide the best direction and actions to take at a given moment.

However, as Vasarhelyi & Alles (2008, p. 227) claim, “Enterprises are entering into the era of the real-time economy, also called the “now economy”, which can be characterized by a substantive acceleration of business measurement, assessment and decision processes.” In addition, Beflo et al. (2015) point out that, the “now economy” poses a new challenge to Accounting Information Systems which is real-time reporting. According to Trigo et al. (2014) real-time reporting or simply real-time accounting can offer several benefits when compared to established periodic reporting systems. Also, higher competition among the increasing global market demands for more and updated information to enable management to rapidly adapt to opportunities and resolve issues, and it might be argued that real-time accounting addresses these needs, but new technological answers are required to address these needs. Traditionally, companies require financial or non-financial reporting based on monthly, quarterly and annual periods. Yet, the rapid changes occurring in market and society cause this periodic reporting to become quickly outdated. The move towards real-time reporting from the simple publishing of financial statements every month is therefore almost mandatory and management accounting must meet this new demand through the use of new technologies.

According to Sahay & Ranjan (2008), there are several complementary technologies available to help implement real-time reporting:

- Business process management, which allows real-time monitoring of business processes that broadcast relevant financial or non-financial information from business operations to management;

- Mobile devices, which allow their users to instantly receive the reports produced anytime and anywhere;

- Cloud computing that allows for instant sharing of information among all users within and outside the organization that need it to make informed decisions;

- Business intelligence, which allows the generation and delivering of more focused and relevant information of business operations to managers, enabling not only the long term planning of the organization goals, but also the management and optimization of daily business operations (event-driven);
Enterprise architecture and enterprise application integration that structures and integrates different systems and their corresponding data present in the organization to allow real-time report generation with added value to users.

In addition to the above literature, IoT (Internet of Things) is another technological advancement that is rapidly emerging in the accounting industry. According to Biliana et al. (2017) the IoT is a system of interconnected devices, machines and appliances which communicate with each other and exchange data using the internet in real-time, without any human intervention or interaction. In short, with real-time updates enabled by IoT devices, the analysis of vital and relevant information would provide organisations with many new avenues for better business planning and resource allocation, and would also help to optimize operational processes, minimize expenditures, and enable management to respond to issues immediately.

2.3. Enterprise resource planning (ERP) systems and management accounting challenges

Increasingly, contemporary organisations are choosing to purchase standard software products that are designed based on business practices that have been deemed the most appropriate for achieving organizational goals. This so-called ‘best practice’ model has a long history and is currently popularized in the form of ERP packages, arguably the most popular business software (Newell et al., 2000). Moreover, as Chien & Tsaur (2007) note, nowadays research within management accounting and information systems is coming alive with the advent of integrated information systems such as ERP systems. In this context, information management has emerged as the most common brief name for the management of the use of information technology in an organisation (Frishamar, 2002).

Organisations adopting ERP software need to configure the software to meet their local needs and these ‘best’ practices are typically designed with a software company working in a partnering relationship with a key industry customer to develop a package to meet the unique requirements of a particular industry (Wagner & Newell, 2004). Furthermore, according to Alsop (1998), the age of ‘networked computing’ emerged when the computer industry developed ways of connecting PCs into larger systems using client-server technology, which paved the way for integrated information systems, and especially, ERP systems, such as SAP, Baan, Oracle and PeopleSoft. Furthermore, Burns
et al. (2003) note that developments in IT have enabled ERP systems to be used for information sharing with suppliers and customers. However, as Scapens & Jazayeri (2003) point out, such systems are claimed to have significant implications for accounting, and especially management accounting practices.

Maccarone (2000) argues that RRP systems’ users can access real-time information on all aspects of the business which might place new requirements on accountants and accounting systems, and Booth et al. (2000) believe that ERP systems will reduce the need for accounting personnel in both financial reporting and the provision of management information. However, Goosen & Rudman (2013) claim that such systems will enhance the role of management accountants and financial managers, and that they will become advisers or internal consultants to other managers. He argues that ERP systems are likely to reduce the number of people in the finance and accounting function, as line managers will have the facility and knowledge to manage their own costs and budgets. Nevertheless, according to Goosen & Rudman (2013) there will still be a need for at least some management accountants and financial managers to advise and support these managers.

Such arguments about the impact of ERP systems on management accounting, have been given a lot of attention in the academic accounting literature. Thus, Boulianne (2014) argues that advances in computer technology and the integration of operating control systems with management information systems, mean that managers can have online access to the information they need to control all aspects, including the costs, of their operations. As managers can access a great deal of information for both decision support and control, they do not need to wait for the periodic reports produced by management accountants. Perhaps, it can be suggested that the introduction of ERP systems might have important implications for the nature of management accounting, the role of the management accountant and the relationship with operating managers.

Given this increasingly complex context, the university sector represents an industry in which enterprise systems are increasingly being implemented in order to modernize management accounting systems functions via different integrated technology platforms (Wagner & Newell, 2004). It might be argued that Management accountants will play a more dominant role in current and future universities’ strategies with the introduction of technology-based management accounting. Accounting software are changing the
organisational structure and the business world; as such management accountants now have new height to focus, especially with changed performance measures (Moorthy, 2012). Perhaps, in large organisations, the use of innovative software in accounting information systems might benefit management accountants to collect and analyse data.

2.4. The use of software (engineering) in accounting information systems

Pressman (1987, p. 19) defines software engineering as “The establishment and use of sound engineering principles in order to obtain economically, software that is reliable and works efficiently on real machines”. Production of software requires a number of interlocking steps, and as O’Leary (1988) points out, these steps, typically referred to as the “classic” life cycle of software, include the analysis of the system needs, design of a system, programming of the system, securing the system, testing the system and then maintaining the system. However, Hyvonen (2006) points out that, even though the changes in the organisational and software engineering contexts in which accounting operates, are challenging for those who design management control systems, there are many management accounting software solutions on the market, offering better cost efficiency in implementation.

Tight global competition forces organisations to look for cost-cutting in all functions. The call for better decision making together with cost effective processes has led to the outsourcing and the establishment of innovative accounting software for efficient management accounting practices. It is a fact that software engineering can help in realizing such objectives. According to Chapman (2005) Software Engineering in Management Accounting Systems is increasingly being recognised and used as a tool to assist with managerial activities that involve decision making for complex organisational problems. Thus, as Granlund (2011) claims, the relationship between software engineering and accounting plays an important role in creating new knowledge, and functions as it helps employees to collect and analyse data as well as direct decision makers’ attention to potential problems and solutions to aid their decision making. Furthermore, it is of interest to researchers and practitioners alike how ready-made software packages may be successfully used in implementing the changes needed in the management accounting systems of large organisations (Hyvonen et al., 2006). It is also particularly interesting to find reasons why software packages seem to be so useful in driving these changes.
Accounting software automates the traditional paper ledgers and accounting books and has also improved the functionality of accounting departments by increasing the timeliness of accounting information. Hyvoven (2003) points out that organisations are implementing standard software packages for costing, profitability analysis and management reporting, and that all these software packages reshape both accounting and managerial work. Thus, by improving the timeliness of financial information, accountants can prepare reports and operations analyses that give management an accurate picture of current operations. As noted by Ghasemi (2011), software packages which come with a variety of specialized features or a generic program that can be customized to current business operations, have improved traditional operations and production processes. Also Shafer & Byrd (2000) point out that organisations usually choose accounting programs based on the size of their operations and the number of users accessing the system. Thus, large organisations may choose system-wide software packages, such as an ERP system.

In addition, Brignall & Ballantine (2004) suggest that not only has accounting software shortened the lead time required to present financial information, but it also has improved the overall efficiency and accuracy of the information. Therefore, it might be argued that accounting software packages have shortened the lead time needed by accountants to prepare and present financial information to management and stakeholders. Perhaps quicker processing times for individual transactions have also decreased the amount of time needed to close out each accounting period. Month or year-end closing periods can be especially pressurised on accounting departments, resulting in longer hours and higher labour expense. Shortening this time period aids companies in cost control, which increases overall company efficiency.

However, as argued by Liew (2014), the effects of software engineering are poorly reflected in the existing management accounting literature, which has focused largely on the technical design aspects of software, rather than on managerial issues and control implications. In particular, Granlund & Mouritsen (2003) note that the literature has been criticised for not considering how exactly software drives management control logic. Given the increasing use and reliance on software and the important role it plays in management accounting, it is imperative that one understands the resulting effects from the use of accounting software for management control.
IT innovations are implemented and used merely to improve efficiency with regard to task, functional or organizational level performance. However, it could be argued that the use of software as a formal mechanism to enact and enforce automated management control can influence the behaviour of individuals in understanding the use of such automated mechanism. As Merchant and Stede (2007) claim, using software as a formal control mechanism may help provide management with automated management control to actively monitor and intervene in the activities of their subordinates. Furthermore, technology-structured management control has the potential to increase transparency and provide openness to organisations and accountability among individuals (Brivot & Gendron, 2011).

According to Castells & Himanen (2002), in the most advanced societies, many organisations have already entered the era of digitized accounting practice, thanks to the development of software engineering. However, as Hanseth et al. (2001) highlight, trust in new accounting software, helping managers to cope with current risks by enhancing the performance of such expert systems as management accounting, may lead to new risks, possibly in the systems themselves, but what these risks may be are yet largely unknown or unproven. Also, many questions arise regarding how well managers actually know the everyday life of financial professionals of today, especially as regards the role of software in their work. Furthermore, Grabski et al. (2009) claims that more than half of a manager’s working time may be devoted to system design and implementation, negotiations with software vendors, teaching other people to use new systems, and integration of the different systems into a working platform, and also, they are often responsible for setting up management accounting systems from budgeting to sophisticated analysis and managerial reporting.

Considering the above information, it could be argued that accounting software have become the most useful and valuable tools in the current business environment. The speed at which large amounts of data are processed could be one of the most significant advantages to current business environments. Despite all these benefits brought into the accounting discipline by innovative software, Hekmati (2011) points out the disadvantages of using computer software in accounting, highlighting that it is possible that data can be lost due to software and hardware breakdown or as a consequence of a security attack with the possibility of a change of data due to fraud and embezzlement,
vandalism, sabotage, arson and malicious damage. Unfortunately, total security is impossible and there will always be some risks that cannot be avoided or prevented.

2.5. The selection of Accounting Software packages

It might be argued that the accounting software selection process could be complex because of the large number of choices available, the strengths and weaknesses of the various packages, and their cost. According to Rushinek (1995, p. 29), the way in which software is selected should be a two-step process. The first step is to define which feature is the most important, while the second step is to select the software which best matches those important features. Organisations face the challenge of selecting the correct accounting software package at the start of their business as well as the proper implementation of such package. This challenge is also faced by current organisations planning to replace or expand their current software. Part of this challenge is to successfully map business strategies at a strategic level with the functionalities of the considered generic accounting package before purchasing and implementing the software. During the accounting software-implementation process, software functionalities should, therefore, be properly aligned with the key business strategies to prevent future business system failure (Dwivedi et al., 2015). Perhaps, as Broida & Flora (2015) suggest, a good accounting software package should use a standard interface between modules, deliver accurate periodic reports, help validate new data, and offer ease in extracting historical information for trend analysis.

Bishop (2017) claims that implementing a new accounting information system (IS) in an organisation can be a quite expensive process that requires a considerable amount of time and skills. Hedtke (2007) also explains, how various small accounting software packages have everything that organisations require to operate successfully, as these smaller accounting packages are generally more affordable, user-friendly and easy to set-up. Organisations generally prefer to purchase and install generic accounting packages and use them to manage their entire business operations rather than developing their own customised packages, due to capacity constraints and costs, as well as the time and information technology (IT) skills that may be required (Blount et al., 2016).
Many authors, such as Davenport (1998), have mentioned the importance of aligning accounting package functionalities with business objectives, specifically on a strategic level. The functionalities of most accounting packages are mostly limited and generic and require low costs to maintain (Temtime et al., 2003). As a result, it might have all the functionalities of a proper accounting system, but may fail to provide functionalities that successfully manage the entire business system and succeed in reaching the strategic goals of an organisation. In addition, according to Bishop (2017, p. 46) “Real-time information should be available to managers that are using information to make decisions. This implies that the accounting software should have the functionality where appropriate information is generated at any given time, either via reports or graphs.” Thus, real-time information should be accessible by operations managers and other employees to enable them to efficiently react on service requests. However, as noted by Matejun (2014) unfortunately not all small accounting software have the functionality of instantly being able to provide management information.

2.6. Workflow diagrams and Business Process Models

According to Georgakopoulos & Hornick (1995), workflow is a concept closely related to re-engineering and automating business and information processes in an organization. Organisations’ processes require continuous improvement, and organisations often need ways to improve those processes and minimize inefficiencies that prevent them from performing at their best. One of the best ways to do this is by creating workflow diagrams that provide a graphic overview of a business process, that simplify the understanding of business activities, define roles and responsibilities within those processes, and help identify bottlenecks that keep things from running efficiently (Sarshar & Loos, 2007).

The representation of business processes is a concern dating from the last century. Business process modelling becomes an increasingly important task not only for the purpose of software engineering, but also for many other purposes besides the development of software (Becker et al., 2012). Geamsasu (2012) claims that initially, the processes taking place within organisations were represented using Workflow Diagrams, which were centred on the activities of each department. Subsequently, Business Process Models (BPM) were developed, representing processes covering several departments, capturing the whole organization. Thus, it can be said that Workflow Diagrams are
centred on the processes carried out by people, based on documents, while Business Process Models are focused both on people and on system processes.

A growing interest of organisations in improving their business processes, in order to be more competitive in a globalized economy has been noted by Geambasu (2012) during recent years. In addition, Țartăvulea, et al., (2011) highlight that business process models in business process management and systems engineering are created to understand the key mechanisms of an existing business, to orient the creation of suitable information systems, to implement improvements in the current business and to show the structure of an innovated business. Perhaps business process models can help the management in taking adequate decisions in important problems of the organization life. Thus, as Birkmeier (2010) points out the first step in achieving this goal is to use an adequate business process modelling language such as the Business Process Modeling Notation (BPMN) and Unified Modeling Language (UML).

2.7. Business Process Modeling Notation (BPMN) and Unified Modeling Language (UML) overview

According to Mazanek & Hanus (2011), the primary goal of BPMN is to provide a notation that is readily comprehensible by all its users, from the business analysts that create the initial drafts of the processes, to the technical developers responsible for implementing the technology that will perform those processes. Moreover, as mentioned by White (2004), BPMN allows the creation of "end-to-end" business processes, being designed to cover many types of modeling, so that they can communicate a wide variety of information to a wide variety of audiences. While on the other hand, Zhang & Duan (2008, p. 508) note that the main objective of UML is “to provide system architects, software engineers, and software developers with tools for analysis, design, and implementation of software-based systems as well as for modeling business and similar processes”.

The question that arises is, which one of these two business process modeling languages, BPMN or UML diagrams, should be chosen by large organizations such as universities for modeling their business processes? Looking at the capacity of being readily comprehensible, Peixoto, et al. (2008) showed that the level of difficulty for understanding the business process, in both languages, is the same. Another aspect that
should be considered is the complexity of the graphical symbols used to represent the real business processes of an organization. And, as Eriksson & Penker (2000) note, in many cases, BPMN and UML AD use similar symbols to describe business processes. In addition, as Geambasu (2012) points out, there are aspects of business processes that can be modeled in BPMN using only one symbol, but for which the representation in UML requires the use of a group of symbols.

However, as argued by Martin & Osterling (2014) the main differences between UML and BPMN is that, UML takes an object-oriented approach to the modeling of applications, while BPMN takes a process-oriented approach to modelling of systems. Thus, where BPMN has a focus on business processes, the UML has a focus on software design and, therefore, the two are not competing notations but are different views on systems. Though, as Park & Lee (2006, p. 42) claim that “Object-oriented technology has been gained attention to overcome software crisis”, it could be argued that currently, object-oriented technology can be used to develop business information systems, including ERP systems for improving core competency. Furthermore, Larsen et al. (2007, p. 85) highlight that in large organisations, object-oriented modeling have demonstrated to be an excellent technique for modeling business processes. Recently, business modeling is a new area for object-oriented modeling and has generated a lot of interests.”

In addition, as noted by (Berkenkotter, 2003), today, UML it is the "language" of software engineering. It is used not only for specifying a system, but also for communication purposes between people involved in developing a system such as engineers, computer scientists and managers.

2.8. Functional decomposition approach using Data Flow Diagrams

Focusing on the application of business process models, UML is held to be a powerful framework and notation for modelling business processes and objects (Vidgen, 2003). Requirements mapping and analysis are key issues within the domain of representation. In addition, there are also unique challenges faced in real-time software development. In fact, as Ashrafi (2003, p. 677) notes “For real-time system developers, understanding the impact of design decisions and effectively communicating functionality can be a daunting task. An overriding concern is the architecture of the software.” To facilitate the design of good architectures, it is extremely useful to capture the proven architectural design
patterns of the domain as first-class modeling constructs. Perhaps, looking at the below example in Fig. 2.1. Pavaloaia & Strimbeia (2015) demonstrate a series of manual accounting operations activities taking place within an organisation thanks to an UML activity diagram.

As Saleh & El-Morr (2004) claim, UML for Real-Time represents a collection of best engineering practices that have proven successful in the modeling of large and complex real-time systems. Thus, looking at the above Fig. 2.1, it might be argued that in order to make a real-time management accounting system that maintains an ongoing and timely interaction with its environment, the link between the “Receive the sale transaction” and “Register the accounting transaction” in the account and financial operational system column in the middle should be automated. In addition, Fig. 2.2. on page 28 (Iyadobe et al., 2015) shows the application of UML activity diagrams for existing ATMs (Automated Teller Machines) used in the banking sector for cash withdrawal. Perhaps, this is something that could be integrated in the accounting operations activities taking place within a large organisation such as universities as the user's (budget holder) remaining budget is automatically updated once the transaction or task is completed.
Fig. 2.2 UML activity diagram for existing ATMs using cash withdrawal, Iyadobe et al. (2015)

However, as Vidgen (2003) notes, UML activity diagrams are typically used for object oriented system development, while Data flow diagrams (DFD) are used for a functional decomposition approach, by breaking a system description down into increasingly finer detail. In this research attention will be given to DFD as a preliminary step to create an overview of the system in which a process on a given chart is explained in greater details on another chart to show the highest level of data. Hence, as the DFD’s main strength is to see inside a system in all its details, this paper will use this method to identify any issues and challenges presented by CCCU financial systems.

Gane and Sarson symbols seen in Fig. 2.3 on page 29, will be devised in this research as a standard set of symbols for the data flow diagrams, in which: the “process” is used to show the actions performed inside the system; the “data store” indicates the data at rest inside the system; the “source/sink” show the external entity that is the origin or
destination of data outside the system, while the “data flow” indicates the movement of data (Ibrahim and Siow, 2010).

However, after gathering data and a critical university insight from the participants interviews, a context data flow diagram, similar to the below ordering system in Fig. 2.4 will be applied to the existing financial systems/processes at CCCU.

Fig. 2.3 Symbols for DFD elements, Ibrahim and Siow, (2010)

Fig. 2.4 Context diagram of an ordering system (Jeffrey et al., 2014).
Further, a level-0 data flow diagram similar to the below Fig. 2.5 will be drawn to then be decomposed into more explicit lower-level DFD to represent the university financial system and processes in more details (Jeffrey et al., 2014).

Fig. 2.5 Level 0 diagram of an ordering system (Jeffrey et al., 2014).

This section has outlined the approach taken in carrying out the research. Thus, the next section analyses the results from the interviews by grouping in different themes. In addition, in order to have a better understanding of the existing financial systems/processes within the university, physical data flow diagrams will be used to analyse the university financial systems in all its details.

2.9. Current challenges facing universities

Focusing specifically on university management accounting systems, Yongfan (2012) points out that, in universities today, accounting systems collect large amount of financial
data, and therefore, it is vital for universities to integrate high-tech technology and related software to effectively manage the financial. Yongfan (2012) highlights that, within the university context, accounting systems are gradually expanding, becoming increasingly complex, which can also result in new challenges and problems to those in management positions. In very fast changing times, universities are actively looking for methods to improve the efficiency and profitability of their performance. Thus, Kloviene and Gimzauskiene (2015, p. 1707) point out that, “Making high-quality and timely decisions depends in part on the quality of the data and the existence of on-line and real-time information.”

In addition to the above arguments, there are a number of increasing financial pressures facing universities in England such as: the advent of the £9,000 tuition fee per year from 2012, as significant increase from the previous £3,290 (BBC NEWS, 2010); the removal of the university recruitment cap from the 2014-2015 academic year, hence universities have been able to recruit as many students as they like (The Guardian, 2014) along with the referendum result in 2016 to leave the European Union. These pressures have raised many questions on the future of higher education (The Guardian, 2017). Thus, given the current challenges affecting the university sector, university budgets have been tightened up and the function and role of management accounting has been looked more in depth in order to tackle those challenges (Marcela & Knox, 2004).

Computers, servers, the Internet, wireless and personal digital devices have forever transformed the way companies conduct business. In the last few decades, the development of IT within the university systems, has been greatly changing and improving the way finances are managed with the aim to perfect management information systems and for preventing financial risks. However, Ferrer (2014) underlines that, universities can improve their productivity and efficiency through the appropriate use of IT, only if there is a direct involvement of the senior management team in the design, implementation and evaluation of advanced accounting software programme. As a result, the process of modern management with its emphasis on detailed information for decision-making, provides a remarkable impulse for the development of innovative Management Accounting systems within the university context that allow universities’ department staff to monitor the expenses incurred and remaining budget in real time.
To summarise the key points raised in the above literature, it can be widely acknowledged that IT plays an important role in the field of accounting, and it could, therefore, be deduced that the influence of computer software in accounting has prompted positive opinions about the enhancement in efficiency and profitability of accounting information systems, and also that, the move towards real-time management accounting reporting systems is almost mandatory in large organisations. Thus, as it will be seen in the next sections, this paper will use data flow diagrams as a starting point to support the analysis of the illustration of how data flows through the accounting information systems (AIS) to develop a framework for a real-time management accounting system to enhance budget decisions as well as reduce administrative labour in the School of Human and Life Sciences at Canterbury Christ Church University.
Chapter 3

RESEARCH METHODOLOGY

3.1. Introduction to research methods

Research methodology refers to the approach a researcher uses to collect information and gather data in order to carry out the research. It is the procedural framework within which the research is conducted. Also, the research describes an approach to a problem that can be put into practice in a research program or process (Remenyi, et al., 1998). Thus, this section will cover the research methodology that will be used for generating the data necessary to obtain answers to the research objectives. In order to do this a series of steps will follow.

Looking at the accounting area, quite often researchers use different types of data analysis techniques to test the accountability and the efficiency of their research. Therefore, this research will examine both qualitative and quantitative research techniques to understand the need for managers to have real time financial data available to enhance budget decisions and it will highlight examples of the usage of each particular method or technique used. The use of these techniques should lead to the development of a framework to model a real-time management accounting system for use within a university.

3.2. Defining research and justification for the chosen methodology

Before outlining the research process it is fundamental to understand what research is in order to gain the confidence a researcher needs to achieve his/her aims. In good research the researcher has to apply the knowledge, evaluate the different types of research methods, data collection and analysis (Wilson, 1997). In addition, as Sekaran (2000) notes, research is ‘an organised, systematic data-based scientific enquiry or investigation into a specific problem which is undertaken with the objective of finding solutions or answers to it’. Furthermore, implementation and design of research techniques are key
factors in the successful completion of the job. Thus, the main purpose of applied research is testing or refining ideas, to discover, interpret and develop new methods and systems which assist in the advancement of human knowledge (Zikmund, 1991).

There are two different approaches to research which are quantitatively research and qualitative research (Cinnamon, 2008). The quantitative methodology is about reviewing and analysing the numbers presented in the research, while, on the other hand, qualitative measurement techniques are based on discussions, questions and answers, and it does not produce generalizable results. However, in some cases the quantitative results may also be produced from qualitative research methods such as interviews, and it is referred as quantitative technique measures. Thus, in this research, a mixed methodology of both quantitative and qualitative research methods is implemented as it could be argued that in applying both methodologies on a single piece of research, this would yield the most effective and liable results possible.

3.2.1. Interviews methods

Interviews are a qualitative method of research and enable gathering a range of in-depth information from interviews. According to Hair (2011), an interview is where the researcher speaks to the respondent directly which is particularly helpful in gathering data when dealing with complex or sensitive issues. Furthermore, as noted by Hair (2011), interviews can be divided into structured interviews (predetermined questions used in the interview sequence), semi-structured interviews (researchers are free to exercise their own initiative in following up a participant’s answer to a particular question) and unstructured interviews (the interviewee engages in the interview in free and open discussion on the topic of interest without the use of an interview sequence). Whether structured, semi-structure or unstructured, an interview can be implemented in various ways, such as via telephone, Skype or face-to-face.

Focusing on the utility of interviews as a research method within the university sector, Machera (2017) uses a face to face semi-structured interview technique to investigate whether staff in the finance department at Boho University face any accounting software challenges during their daily activities. The main objective of Machera’s study was to identify employees’ perception and benefits accrued from the implementation of computerised accounting software in the university finance department. The results
revealed a consensus about the benefit of having computerised accounting software as those would add value to individuals’ jobs and could enhance the performance in the workplace.

Looking at another example, Monaghan, et al. (2009) investigate academic leaders’ and administrators’ perceptions on the ideal university financial system, exploring innovative ways of dealing with the financial pressures. The research was conducted at five US universities and face to face semi-structured interviews were used to access what key factors were considered in the existing university financial system, what factors should be part of the university financial system and how motivated university employees are in enhancing their financial systems. In Monaghan et al. (2009)’s research, the interview questions assessed the current university financial systems and solicited opinions on what an ideal financial system would be. The interview data were compiled by each university’s investigator into Microsoft Word and coded it using categories and groupings first, followed by synthesizing the grouped data according to themes. The results highlighted the need to engage and enhance universities’ financial systems using computerised accounting software as very little flexibility was offered to maintain and operate current financial systems, and also, given the limited financial resources, these improvements were limited to the short run.

It could be argued that the methods for selecting academics and administrators in Machera (2007) and Monaghan (2009) researches introduced possible bias and power as in some universities, only top-level administrators were chosen based on their schedules and accessibility. In addition, the inclusion of part-time staff in each university also introduced bias as the expectations and nature of their part-time status, may differ from full-time members. Furthermore, the other major limitation might be the small sample size that limited the ability (or potential) to generalize the results. However, in order to tackle some of the above issues and challenges from the above researchers, to keep a high level of attention, all the interviews conducted in this research were be face-to-face semi-structured interviews with a follow-up on particular questions, lasting no more than 15 minutes. Also, in order to reduce bias, only full-time staff members that engage with the university financial system on the daily basis were selected as the expectations and nature of a part-time status, may differ from full-time members.
In universities, the use of an interview can uncover individual’s understanding, views and opinions on the roles they play in an organisation. However, some disadvantages might also occur. For instance, there can be occasions where the interviewee may not be entirely honest and truthful when providing an answer. In addition, as Hair (2011) points out, the reliability and honesty of participants might be questioned, especially for interviews conducted over the phone. Moreover, the perceived aim of an interview might be different from one individual to another as in long interviews the level of attention from the participant side might be different throughout the interview.

In interviews, the interviewer encourages the interviewee to explain answers and asks supplementary questions (Pentland, 1999). Qualitative interviews should be fairly informal, and the questions asked should be: how, what, who, where, when and why. Participants should feel like they are taking part in an open conversation rather than a formal questioning, where the reliability and honesty of participants is also questioned especially for questionnaires sent via post or email (Patton, 2002). Also, Sutton (2011) notes that the reliability of the answers can particularly be doubted in focus groups, where semi-structured interviews are used to collect data through group interaction. In this instance, the participants involved may not be able to express their opinion openly as they may feel uncomfortable in sharing their opinions in front of others, especially when there is a dominant individual who may influence other participants’ views. Hence, considering the above challenges, for the purpose of this study, both the questionnaire and focus group research techniques will not be used. Consequently, face-to-face semi-structured interviews were implemented.

3.2.2. Selection of participants

As one of the objectives of this research is to understand the need for managers and budget holders to have real time financial data available to enhance budget decisions as well as reduce administrative labour, a series of interviews took place to gather the data needed with the School’s managers and budget holders and with the administrators who interact with the University financial systems. Thus, the first step was to look into the university webpage, under the professional service department’s tab, to find out all the administrators that needed to be contacted (CCCU, 2018). Furthermore, as the research especially focuses on the School of Human and Life Sciences, the next step was to look
at the School’s webpage to identify the different sections, and, therefore, the different managers and budget holders within the School (CCCU, 2018).

Similar to Monaghan et al. (2009)’s research, where the participants were divided into two categories (administrators and academics) with separate interview questions, this research also had two different sets of questions for the two different categories, one for administrators from the professional service departments and one for the schools’ budget holders and managers.

As a result, all the administrators from the professional service departments who interact with the university financial systems were asked to provide useful insight about the ability to complete tasks using the current financial systems and the overall level of usability of the financial system through a set of questions used to gather qualitative information. While the school budget holders were asked to provide both qualitative and quantitative information by sharing their view on the current financial data available from the management account reports with the aim to understand the need to have real time financial data available to enhance budget decisions. Thus, 16 administrators from the University professional services departments as well as 5 managers and budgets holders were identified and interviewed for this research and the interview data gathered from the two categories were synthesized according to themes.

In this research, the questions used for the semi-structured interviews of the two categories were very similar to the ones used by Machera (2007) to identify employees’ perception and benefits accrued from the implementation of computerised accounting software in the university finance department, and also to the questions used by Monaghan (2009) to investigate academic leaders’ and administrators’ perceptions on the ideal university financial system, exploring new innovative ways of dealing with the financial pressures. Thus, the combination of Machera and Monaghans’ research questions, with some adjustments on few of them, lead to the set of questions as seen in appendix_1 and appendix_2.

However, as another objective of this research is to analyse the existing accounting information system, the information collected from the interviews was then be used to create an overview of the university financial systems through the application of data flow diagrams, in which one process on a given chart is explained in greater details on another chart.
3.3. Limitations of the study

There are a number of limitations that have to be taken into account. Thus, the use of an interview can uncover individual’s understanding, views and opinions on the roles they play in an organisation. However, there can be occasions where the interviewee may not be entirely honest and truthful when providing an answer. Also, it might be argued that the administrators’ perceptions of the importance of various factors in an ideal university financial system might differ from a managerial’s point of view, as maintaining and operating university financial systems is mainly an administrative duty. In addition, the other major limitation might be the small sample size of just five 5 managers and budgets holders identified and interviewed for this research in the School of Human and Life Sciences at CCCU as this might limit the ability (or potential) to generalize the results.
Chapter 4

ANALYSIS OF CCCU FINANCIAL SYSTEMS

4.1. Introduction to analysis and justification of the chosen questions

In analysing the data, it is essential to bear in mind the aim and objectives of this research. Thus, the aim of this study is to do an analysis of existing accounting information systems (AIS) to develop a framework for a real-time management accounting system in the School of Human and Life Sciences at Canterbury Christ Church University. While the objectives are:

1) To analyse of the existing accounting information systems (AIS)
2) To understand the need for managers (Directors/Head of Schools) to have real time financial data available to enhance budget decisions as well as reduce administrative labour
3) To develop a framework to model real-time management accounting system

4.2. Justification of the chosen themes for administrators

Different themes for the administrators were selected for the purpose of this research. The choice of the themes were linked to the applicable research aim and objectives and also to the research questions and literature. Thus, the below 5 themes were drafted to convey the findings of the analysis.
Themes of answers for administrators

a. Obtain an overview of the financial system used within the university
b. Investigate how the spending is processed and recorded through the financial system used
c. Observe the frequency of the financial data sent to management account
d. Examine the perception and understanding towards an automated real-time financial system
e. Understand the benefits that could accrue from the implementation of an automated real-time financial system

a. Obtain an overview of the financial systems used within the university

The above theme is a combination of the 2nd question for the administrators (How many Financial Systems and procedures do you use on your daily job? Please specify) and the first research objective (To analyse the existing accounting information systems). The below answers given by the participants regarding the financial systems are grouped in a unique combination.

‘We use Agresso’

‘We use Agresso and World Pay (Credit Card)’

‘We use and process credit card payments, foreign payments, student expenses, outside parties expenses payments’

‘Mainly we use Agresso, but also credit card payments and staff expenses’

‘We use Agresso, Credit Card payments and Booksolve system’

‘We use and process VT2000, Unitemps, Itrent (New Payroll system), One off claim forms and staff expenses’

‘We use Agresso and credit card payments’

‘We use Agresso, credit card, foreign payments and the IT purchasing tool’

‘We use the Neopost Software’

The answers given show that different professional services departments within the university use different financial systems and procedures to operate on the daily basis.
The Agresso system is used in the whole university and is seen as the core system, except for a department that only use Neopost software, also there is another department that does not use Agresso as they use credit card payments, foreign payments, student expenses and outside parties expenses payments, and also another department that use several software such as VT2000, Unitemps, Itrent (New Payroll system), One off claim forms and staff expenses except Agresso. However, from the answer given, it can be seen that in several department the use of alternative systems such Credit Card payments, Booksolve software, foreign Payments and the IT purchasing tool were also used alongside the Agresso System.

The answers given also replicates what is happening at the moment in large organisations as Wagner & Newell (2004) claim that the university sector represents a complex context in which financial systems are increasingly being implemented via different integrated platforms.

b. Investigate how the spending is processed and recorded through the financial system used

The above theme is a combination of the 3rd question for the administrators (Is the system/procedure that you use to process the spending automated, semi-automated or manual?) and the first research objective (To analyse the existing accounting information systems). The responses on page 42 grouped in a unique combination highlighted the mixture of processes used (automated, semi-automated and manual) and also different ways and methods to record the financial data.
The spending is processed through a semi-automated system and the financial data is recorded on an excel spreadsheet.’

‘The spending is processed through a semi-automated and manual system and the financial data is recorded on Agresso and on an excel spreadsheet’

‘The spending is processed through a semi-automated system and the financial data is recorded on few different excel spreadsheets depending on the type of request’

‘The spending is processed through an automated and semi-automated system and most of the financial data is recorded on the Booksolve software and Agresso. Also, on an excel spreadsheet we record the credit card transactions’

‘The spending is processed through a semi-automated system and the financial data is recorded on Agresso’

‘The spending is processed through a manual and semi-automated system and the financial data is recorded on an excel spreadsheet, on paper and electronically.

‘The spending is processed through an automated system and the financial data is recorded electronically’

Most professional services departments process the spending in a semi-automated system (Agresso) but at the same time a manual system is used to record the financial data in different excel spreadsheets, because as already mentioned in the previous theme alternative systems are used alongside Agresso. Thus, the implication of this would be to have a complex and time-consuming process to deal with. Perhaps, CCCU should follow Rezaee et al (2000) view as it is noted that in the current business environment, financial transactions are now being captured, measured, recognized, and reported electronically, without any paper documentation and that online, real-time accounting is emerging as the system of choice.

c. Observe the frequency of the financial data sent to management account

The above theme is a combination of the 7th question for the administrators (When do you send the financial data to Management Accounts?) and the first research objective (To analyse the existing accounting information systems).
The below responses grouped in a unique combination regarding the financial data sent to Management Accounts, highlighted the complexity and also the impact that the different financial systems used in the university have in recording the financial data with Management Account as they noted that:

“We send the financial data on a spreadsheet to Management Accounts on the monthly basis, on the last day of the month”

“We do not send any financial data as Management Accounts extract the data directly from the Agresso system on the same day that they send out the management accounts reports”

“We send the financial data on a spreadsheet to Management Accounts on the first of each month for the previous month”

“We send the financial data to Management accounts at the end of the month. Also, Management Accounts extract a report from Agresso and send that to us to double check that everything is correctly charged before the reports are sent out”

“We make available all our financial data to Management Accounts at the end of the month on a spreadsheet saved on a shared drive which Management Accounts has a ‘read only’ access.

“As we code all the department purchasing requests directly to the department cost centre, we do not have to send any financial data to Management accounts as the department requesting our service is responsible for it”

“We download the reports from the Neopost software, copy it into a spreadsheet and then send it to Management Accounts on the first day of the month from the previous month”

From the answers gathered, interviewees pointed out different dates for sending the financial data to Management Accounts. All the departments that process the financial data through manual systems, send an excel spreadsheet to Management Account on the last day of the month or on the first day of each month for the previous month. While, for the departments that use Agresso, Management Accounts extract the data directly from the Agresso system on the day they send out the management accounts reports.

Thus, it might be deduced that, the continuous developments in different IT platforms at CCCU have not yet transformed accounting information systems, into more competitive and simpler systems. Perhaps, as already mentioned by Sutton (2006) the way in which
the financial data flows from the professional services departments to management accounts appears to be complex and unpredictable.

d. **Examine the perception and understanding towards an automated real-time financial system**

The above theme is a combination of the 9th question for the administrators (*What is your perception and understanding towards an automated real-time financial system in the university?*) and the first research objective (*To analyse the existing accounting information systems*). The below responses grouped in a unique combination highlighted different opinions, but with the general agreement that such system would allow people to know exactly what they are spending and what is left on the daily basis.

‘It is a system that allows people to know exactly what they are spending and what is left on the daily basis’

‘It is something that would allow people to monitor their spending in real-time’

‘A system used to see a transaction in real-time’

‘A system that would allow you to do something straightaway’

‘I suppose that with this system you can use the info in real-time and not wait once a month to see a transaction appearing on the reports. At the moment I don’t know what has and hasn’t actually been paid’

‘A system that would be as automated as it could possibly be with a quicker distribution of the invoices’

‘Something quite fast that would enhance the daily administration’

‘A system in which you will be able to search a transaction and the budget at anytime, similarly to a bank account’

‘Something that everyone can use at the same time’

Also, such system is perceived by the administrators as something that would allow people to monitor their spending in real-time and to see a transaction in real-time similarly to a bank account. Perhaps, the administrators’ perception is similar to the above literature as Trigo et al. (2014) claim that throughout the organisation’s life, the real-time reporting in accounting gives complete and instantaneous information about key dimensions of the
organization, allowing management to decide the best direction and actions to take at a given moment.

e. Understand the benefits that could accrue from the implementation of an automated real-time financial system

The above theme is a combination of the 9th question for the administrators (*What are the benefits that could accrue from the implementation of an automated real-time financial system?*) and the first research objective (*To analyse the existing accounting information systems*). The below responses grouped in a unique combination demonstrated a consensus view of the interviewees and the literature on this theme as both heavily stressed the benefits and needs to implement the current financial systems at CCCU.

*Commitment reporting alongside budget management is a key deliverable that could be achieved. This should remove the need for administrators to keep their own financial records’*

‘Managers and budget holders will know exactly what they are spending and what is left on the daily basis as the current financial systems are quite dated’

‘Potentially we could resolve issues and queries quicker and not wait long time to check the transactions on the management Accounts reports’

‘There will be a better budget management and make it easier for administrators’

‘Commitment reporting alongside budget management is a key deliverable that could be achieved. This should remove the need for administrators to keep their own financial records’

‘I would hope that such system could stop the use of many different spreadsheets to record the financial data and use only one centralised system to access all the information’

‘Such system would save lot of manual work and improve the finance administration’

‘It can decrease the paperwork, tracking an order online and possibly increase revenue as the time saved can be used more strategically’

‘It will have more updated information on the spending and on the remaining budgets. Also, it will enhance the decision-making process’

‘An order request can be tracked online instead of sending email or making phone calls’
These responses highlighted that commitment reporting alongside budget management is a key deliverable that could be achieved removing so the need for administrators to keep their own financial records. In addition, participants pointed out that issues and queries could be resolved quicker and not wait long time to check the transactions on the management Accounts reports. Moreover, most of the responses noted that such system will enhance the decision-making process and track online an order request. Thus, as underlined by Goode (2011) in the above literature, a computerised real-time management accounting system could be a useful and valuable tool to enhance the finance administration and to meet the industry requirements for large organisations.

4.3 Justification of the chosen themes for budget holders and managers
Different themes for the schools’ budget holders and managers were selected for the purpose of this research. The choice of the themes were linked to the applicable research aim and objectives and also to the research questions and literature. Thus, the below 5 themes were drafted to convey the findings of the analysis.

Themes of answers for budget holders and managers
a. Obtain an overview of current level of knowledge of the university financial systems and procedures
b. Investigate how the budgets are managed and tracked
c. Observe the frequency of the management account reports
d. Examine the potential gap between the management account reports and the actual “real time” expenditure
e. Understand the perception and need for managers and budget holders to have real time financial data available

a. Obtain an overview of current level of knowledge of the university financial systems and procedures
The above theme is a combination of the 2nd question for School’s budget holders and managers (Do you know what are the financial systems and procedures within the university?) and the first research objective (To analyse the existing accounting
information systems). The below responses clearly demonstrate a limited understanding and knowledge of the university financial systems.

‘I know some of the systems (Agresso, Unitemps, VT2000, staff expenses), and have a very limited understanding of these’

‘Unfortunately, I only know Agresso’

‘I am not entirely sure about all the Financial systems and procedures. However, I am aware of the Agresso tool for purchasing’

‘I understand the broad concept of our financial systems, but not the specific details and procedures’

‘I am only familiar with Agresso to raise an order’

One of the participants did not know the procedures used within the university, the other three participants were only aware of the Agresso tool, while only one of the participants was aware of Agresso but also of the Unitemps, VT2000 and staff expenses procedures used in the university. However, as noted by Guney (2014) at present, having an efficient financial system that can be understood in all its details is one of the main issues that managers face in the university sector.

b. **Investigate how the budgets are managed and tracked**

The above theme is a combination of the 3rd and 4th question for School’s budget holders and managers (How do you keep track of the spending within your budget? and Do you know the exact spent against your budget as of today?) and the first research objective (To analyse the existing accounting information systems).
From the below responses, it appeared to be no doubt that the school’s budget holders and managers have some difficulties in managing and tracking their budget effectively in the current situation.

‘I do not know the exact spent against my budget, but I have an idea of what the budget would be. However, I try to touch base with the administrators on the daily basis to double check their records, especially in particular times of the year where there are big expenses lined up’

‘Unfortunately, I do not know what is left in my budget as of today. However, I see and check the monthly M/A reports, and also ask the school administrators for more info regarding the committed spent’

‘I do not know what has and has not been charged to my budget. So, I partly check via the Management Accounts reports, and also rely on the school administrators who keep track of the spending manually’

‘I am not sure about the exact spent, but I can get a close estimate in a short period of time from the School’s administrators who keep a “mirror” account of the spending’

‘Unfortunately, I would not know the exact spent as there are no tools that would allow me to check and manage the budgets more efficiently. So, at the moment I mainly rely on the Management Accounts reports and the administrators who keep a “live” spending of the budget’

None of the 5 participants know what the exact spent against their budget is at the time of this questionnaire. However, all the responses gathered indicated that the managers and budget holders see and check the Management Accounts reports as a starting point, but they also rely on the school administrators who keep track of the spending manually using a “mirror” account of the spending especially in particular times of the year where there are big expenses lined up, to have a better idea of what the exact budget would be.

Thus, as claimed by Ferrer (2012), a computerised accounting system could enable managers to handle their finances more flexibly, efficiently, and affordably than ever before. In fact, it could be said that with a real-time accounting system available the time
needed by accountants to prepare and present financial information to management systems can be shortened.

c. **Observe the frequency of the management account reports**

The above theme is a combination of the 5th question for School’s budget holders and managers (When do you receive the reports from Management Account?) and the first research objective (To analyse the existing accounting information systems). The below responses grouped in a unique combination show that on average the management account reports are issued on average with a delay of over 14 days, with the 10th at the earliest and the 20th at the latest of the month, and interesting in August the M/A reports were not circulated at all.

‘M/A report for April 2017 was received on the 15/5/2017’

‘M/A report for May 2017 was received on the 20/6/2017’

‘M/A report for June 2017 was received on the 12/7/2017’

‘M/A report for July 2017 was received on the 16/8/2017’

‘M/A report for August 2017 was not received at all’

‘M/A report for September 2017 was received on the 13/10/2017’

‘M/A report for October 2017 was received on the 10/11/2017’

‘M/A report for November 2017 was received on the 12/12/2017’

‘M/A report for December 2017 was received on the 11/1/2018’

‘M/A report for January 2018 was received on the 14/2/2018’

‘M/A report for February 2018 was received on the 15/3/2018’

‘M/A report for March 2018 was received on the 18/4/2018’
d. Examine the potential gap between the management account reports and the actual “real time” expenditure

The above theme is a combination of the 6th question for School’s budget holders and managers (Do you know the potential gap between the management account reports and the actual “real time” expenditure?) and the first research objective (To analyse the existing accounting information systems). The responses grouped in the below table 4.1 demonstrate the differences (shown in a percentage) between the Management Accounts reports and the actual spent for the previous 12 months.

Actually, this system allows individuals in large organisations to create individual reports in a quicker and easier way, to support management decision making.

Table 4.1: Gap between the management account reports and the actual “real time” expenditure

<table>
<thead>
<tr>
<th>Month</th>
<th>BH_1</th>
<th>BH_2</th>
<th>BH_3</th>
<th>BH_4</th>
<th>BH_5</th>
<th>Monthly/School Average Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>April 2017</td>
<td>7.3%</td>
<td>8.3%</td>
<td>5.1%</td>
<td>11.1%</td>
<td>8.1%</td>
<td>7.98%</td>
</tr>
<tr>
<td>May 2017</td>
<td>8.1%</td>
<td>9.1%</td>
<td>7.2%</td>
<td>13.6%</td>
<td>10.6%</td>
<td>9.72%</td>
</tr>
<tr>
<td>June 2017</td>
<td>9.3%</td>
<td>11.7%</td>
<td>8.2%</td>
<td>15.7%</td>
<td>12.1%</td>
<td>11.4%</td>
</tr>
<tr>
<td>July 2017</td>
<td>11.8%</td>
<td>14.1%</td>
<td>13.1%</td>
<td>18.1%</td>
<td>17.1%</td>
<td>14.84%</td>
</tr>
<tr>
<td>August 2017</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
<td>n/a</td>
</tr>
<tr>
<td>September 2017</td>
<td>1.3%</td>
<td>1.1%</td>
<td>1.2%</td>
<td>1.4%</td>
<td>1.5%</td>
<td>1.3%</td>
</tr>
<tr>
<td>October 2017</td>
<td>1.9%</td>
<td>2.1%</td>
<td>1.8%</td>
<td>2.1%</td>
<td>2.6%</td>
<td>2.1%</td>
</tr>
<tr>
<td>November 2017</td>
<td>2.3%</td>
<td>3.7%</td>
<td>3.4%</td>
<td>4.1%</td>
<td>3.7%</td>
<td>3.44%</td>
</tr>
<tr>
<td>December 2017</td>
<td>4.3%</td>
<td>4.1%</td>
<td>3.8%</td>
<td>4.9%</td>
<td>3.9%</td>
<td>4.2%</td>
</tr>
<tr>
<td>January 2018</td>
<td>5.1%</td>
<td>4.6%</td>
<td>4.9%</td>
<td>5.4%</td>
<td>5.5%</td>
<td>5.1%</td>
</tr>
<tr>
<td>February 2018</td>
<td>6.3%</td>
<td>5.4%</td>
<td>5.0%</td>
<td>6.1%</td>
<td>6.9%</td>
<td>5.94%</td>
</tr>
<tr>
<td>March 2018</td>
<td>7.1%</td>
<td>6.5%</td>
<td>6.7%</td>
<td>9.5%</td>
<td>7.4%</td>
<td>7.44%</td>
</tr>
<tr>
<td>Yearly/Budget Holder Average Variance</td>
<td>5.4%</td>
<td>5.9%</td>
<td>5%</td>
<td>7.66%</td>
<td>6.61%</td>
<td></td>
</tr>
</tbody>
</table>
It can be argued that the different percentage of the potential gap between the management account reports and the actual “real time” expenditure kept in the administrators “mirror” accounts are a result of the delay (highlighted in the previous theme) in distributing the Management Accounts reports to the Budget holders and managers.

However, from the figures seen on table 4.1. on page 50 can be seen how the gap tends to gradually increase from August (begin of the financial year) to July (end of the financial year), going from a School average variance of 1.3% across the 5 budgets holders in September to an average of 14.84% towards the end of the financial year. In addition, the above table shows how the yearly budget holder average variance goes between 5% (for the 3rd BH) and 7.66% (for the 4th BH).

e. Understand the perception and need for managers and budget holders to have real time financial data available

The above theme is a combination of the 10th question for School’s budget holders and managers (What are the benefits that could accrue from the implementation of an automated real-time financial system?) and the 2nd research objective (To understand the need for managers (Directors/Head of Schools) to have real time financial data available to enhance budget decisions as well as reduce administrative labour).

The responses on page 52 have all a general sense of agreement with the above literature regarding the use of innovative software in accounting information systems and their benefit for management accountants to collect and analyse data in real-time for the university managers and budget holders as they noted that:
‘I would be able to make quicker decision based on the information I have, and it would greatly reduce the administrative work. Also, it would allow us a tighter budget control as at the moment we can overspent without nothing happening. Thus, the current financial systems need to be completely redesigned for a better reporting structure.’

‘Having real-time info available would allow me to allocate or re-allocate budgets in a much quicker way to strategic areas identified during the financial year as having the 31st July deadline to spend all the money does not help strategies.’

‘Having real-time data would allow to have a better understanding of the budget used and the ability to see the spending throughout the year. This can be very useful especially when the consumable and equipment can be listed as committed (and therefore not seen on the report) for a long period of time before transferring to actual spent.’

‘By having real-time financial data available would allow to have a more strategic spent and enhance the decision-making process. Thus, there should be more investment in the Management Accounts department in terms of software/systems to reduce the administrative workload especially towards the end of the financial year’

‘Such system would allow me to plan ahead more effectively and be nimbler. I think that anyone who has the responsibility for a budget, would make sense to have a real-time business model similar to having a bank account where you are contacted daily with an updated on the account used’

The participants highlighted that, having real-time info available would allow them to allocate or re-allocate budgets in a much quicker way to strategic areas identified during the financial year as having the 31st July deadline to spend all the given budget does not help strategies. Also, the responses highlighted that such system would allow a tighter budget control as at the moment they can overspent without nothing happening. Furthermore, one of the participants noted that having such a system can be very useful especially when the consumable and equipment can be listed as committed (and therefore not seen on the management account report) for a long period of time before transferring to actual spent.

Higher competition among the university sector demands for more and updated information to enable management to rapidly adapt to opportunities and resolve issues, and it might be argued that real-time accounting addresses these needs, but new
technological answers are required to address these needs. Thus, the move towards real-time reporting from the simple publishing of financial statements every month is therefore almost mandatory and management accounting must meet this new demand through the use of new technologies.

4.4. Application of Data flow diagram on the existing financial systems/processes

In order to have a better understanding of the existing financial systems/processes activity, a current physical data flow diagram will be categorised in internal and external departments and procedures. However, the main difference between the internal and external processes would be that in the internal processes a CCCU staff member will send an order request directly to a CCCU internal department which will liaise with external suppliers if necessary to deal with the request. While, on the other hand, in the external processes a CCCU staff member/student as well as outside parties will use the University financial systems as a tool to interact with external supplies. Thus, on one side the internal processes will be labelled as: IT purchasing tool, bookshop, Photocopying, Hospitality, Post Room, Design & Production, Telephony and Estate & Facilities. While on the other side the external procedures will be labelled as: Agresso Business World, staff expenses, student expenses, outside parties expenses, one-off claim forms, foreign payments, credit cards, Unitemps and VT2000 sessional claims.

Starting with a Context Diagram in Fig. 4.1. and Fig. 4.2. for both internal and external processes, an overview of the organisational systems will show the external entities that interact with the system and the major information flowing between the entities and the system. However, this diagram will only show one process symbol and no data stores are shown at this stage.
Fig. 4.1. Context Diagram for Internal Processes

Fig. 4.2. Context Diagram for External Processes

As seen in the above Fig. 4.1, a CCCU staff member sends an order request to the CCCU Internal financial system before proceeding with an external supply. Once the request is completed the transaction is recorded on the management accounts reports sent to
managers/budget holders. However, Fig. 4.2. slightly differ from Fig. 4.1. as in addition to a CCCU staff member, CCCU students and outside parties also interact with the system, and in addition, all the requests are dealt through the CCCU external financial systems instead of the internal financial systems.

![Diagram](image)

**Fig. 4.3. Level 0 Diagram for Internal Processes**
Looking at the Level 0 diagrams in Fig. 4.3. on page 55 and the above Fig. 4.4. for both Internal and external processes, it can be seen how the system’s major processes, data flows, and data stores are shown at a higher level of detail. However, these processes which seem quite similar at this stage, will be decomposed into more primitive (lower-level) DFDs until the whole University financial system is seen in all its details.
Fig. 4.5. Level 1 Diagram for internal Processes 1.1 & 1.2

The above level 1 diagram in Fig. 4.5. is the decomposition of the level 0 diagram for internal processes for process 1.0 “Receive and transform CCCU staff member request” in sub-processes labelled 1.1 and 1.2. Thus, a CCCU internal department needs to be selected first in order to deal directly with the staff member request.

Fig. 4.6. Level 1 Diagram for external processes 1.1 & 1.2

Similar to Fig. 4.5., the above Fig. 4.6. shows the decomposition of the level 0 diagram for external processes for process 1.0 “Receive and transform CCCU staff member/student & outside parties request” in sub-processes labelled 1.1 and 1.2. However, depending on the type of request, an external financial system is selected from an internal department within the university.
In decomposing process 1.1, the below Fig. 4.7. and Fig. 4.8. show the sub-processes labelled 1.1 and 1.2 for both internal and external processes. Thus, it can be seen the complexity of the existing financial system at CCCU, as a request can go through several internal department or external financial systems before being logged by the department’s admin or the external financial system’s admin.
Fig. 4.8. Level 2 Diagram for external processes 1.1.1 & 1.1.2
Focusing on process 1.2 for both internal and external processes, the below level 2 diagrams in Fig. 4.9. and Fig. 4.10. on page 54 show that every request is confirmed or rejected from a manager/budget holder before placing the order with an external supplier.

**Fig. 4.9. Level 2 Diagram for internal processes 1.2.1 & 1.2.2**
Fig. 4.10. Level 2 Diagram for external processes 1.2.1 & 1.2.2
Fig. 4.11. Level 1 Diagram for internal processes 3.1 & 3.2

The above Fig. 4.3.11, instead shows the decomposition of the level 0 diagram for internal process 3.0 “Produce monthly M/A reports” in sub-processes labelled 3.1 and 3.2. As
seen, in order to prepare the monthly management accounts reports all the purchased data from the 8 internal departments is aggregated together.

Fig. 4.12. Level 1 Diagram for external processes 3.1 & 3.2
Similar to Fig. 4.11., Fig. 4.12. shows the decomposition of the level 0 diagram for external processes for process 3.0 in sub-processes labelled 3.1 and 3.2. However, in addition to the purchased data from the 8 internal departments, the purchased data from the above 9 external financial systems is also sent to the management account department for the preparation of the management accounts reports. Thus, the management accounts at CCCU needs to wait until all the data from the 17 different internal and external sources is received or gather.

Fig. 4.13. Level 2 Diagram for internal and external processes 3.2.1 & 3.2.2

Focusing on the production of the management account reports, the above Fig. 4.13. can be used for both internal and external processes to show the decomposition of process 3.2 in sub-processes labelled 3.2.1 and 3.2.2 However, it can be seen that after aggregating all the data from the different sources, the management accounts reports are sent on the monthly basis via electronic excel.

After the interview analysis of the University administrators from the professional services departments and the Schools’ managers and budget holders, followed by the current physical data flow diagram categorised in internal and external departments and procedures of the existing financial systems/processes activity, the next section will propose a new real-time framework to model real-time management accounting systems.
Chapter 5

PROPOSED FRAMEWORK OF A NEW REAL-TIME SYSTEM AND EVALUATIONS

Following the analysis and considering that on average, a management account report at CCCU is issued with a delay of over 14 days, and that the gap between the management account reports and the actual “real time” expenditure, processed and recorded in mirror accounts by the Schools’ administrators can go from an average of 1.3% September (begin of the financial year) to an average of 14.84% towards the end of the financial year in July, it could be argued that a new physical implementation of the existing financial system at CCCU is needed in order to tackle these challenges.

5.1. Merging internal and external processes into a centralized system

The first step towards the system’s implementation would be to reduce the amount of systems and procedures within the university by merging the 8 internal financial systems/procedures (from Fig. 4.3. on page 55) with the 9 external financial systems/procedures (from Fig. 4.4. on page 56) into a unified central financial system as seen in the below Fig. 5.1. on page 66. Thus, all the financial data will be centrally stored and managed.
Proceeding with the implementation of the existing financial system, the level 1 diagram in Fig. 5.2. on page 60 will be the decomposition of the level 0 diagram seen in the above Fig. 5.1. for process 1.0 “Receive and transform CCCU Internal/External Request” in sub-processes labelled 1.1 and 1.2. Thus, the proposed CCCU Centralised Financial system will replace the 17 different internal & external financial systems and procedures.
By merging all these different systems into a one electronic centralised financial software could possibly reduce the complexity of the existing financial systems at CCCU as at the moment, administrators from different professional services departments as well as CCCU students and outside parties, use different systems (automated, semi-automated and manual) on the daily basis, which do not communicate with each other.

Fig. 5.3. on page 68 shows the decomposition of process 1.1 “Select CCCU Centralised Financial System” in the sub-processes labelled 1.1.1 and 1.1.2. Thus, after that the internal or external request is entered through the main centralised system, in the proposed framework the request moves into one of the 17 sub-processes to then save the financial data within the same shared data store.

Thus, as noted by Brignall & Ballantine (2004) in the above literature, quicker processing times for individual transactions can also decrease the amount of time needed to close out each accounting period. Month or year-end closing periods can be especially pressurised on accounting departments, resulting in longer hours and higher labour expense. Shortening this time period aids universities in cost control, which increases overall university efficiency.
Fig. 5.3. (New) Level 2 Diagram for Processes 1.1.1 & 1.1.2
Focusing on process 1.2 “Process CCCU Internal & External Request”, the below level 2 diagram in Fig. 5.4. for the sub-processes labelled 1.1.1 and 1.1.2, will still be the same process as the one showed in Fig. 4.9. on page 60 and Fig. 4.10. on page 61 as every order request still needs to be confirmed or rejected from a manager or budget holder, before the order is placed with an external supplier. However, the only changes in this process would be that the order request will come directly from the centralised financial system. In addition, after that the transaction is finished, the financial data is updated in the same shared data store.

![Diagram](Fig. 5.4. (New) Level 2 Diagram for Processes 1.2.1 & 1.2.2)
5.2. Developing a real-time management accounting system

Fig. 5.5. below, shows the decomposition of the level 0 diagram for internal process 3.0 “Produce M/A reports” in sub-processes labelled 3.1 and 3.2. As seen, Management Accounts gets the financial data from only one shared data store instead of the 17 different location seen in Fig. 4.11. on page 62 and Fig. 4.12. on page 63. In this way, Management Accounts will not need to extract the financial data from Agresso or wait to receive it from the administrators across the professional services departments. Thus, in the new physical implementation of the existing financial system, this new process is definitely one of the most important as by having the financial data centrally located in a shared data store, it can be accessed and managed in real-time from Management Accounts in order to prepare their reports to Managers and Budget Holders.

Thus, as previously mentioned by Biliana et al. (2017) with real-time updates enabled by a centralised system, the analysis of vital and relevant information would provide organisations with many new avenues for better business planning and resource allocation, and would also help to optimize operational processes, minimize expenditures, and enable management to respond to issues immediately.

Fig. 5.5. (New) Level 1 Diagram for Processes 3.1 & 3.2

Focusing on the production of management account reports, Fig. 5.6. on page 71 shows the decomposition of process 3.2 “Prepare M/A reports” in sub-processes labelled 3.2.1 and 3.2. However, as all the financial data is aggregated from only one centralised data source, management accounts could increase the frequency of the reports sent to managers and budgets holders, as the financial data can be extracted from the new proposed financial system at any time needed.

Perhaps, it could be argued that with this new real-time management accounting system, the reports could be sent on a weekly basis (every Monday for example) rather than sending it on the monthly basis, having so 52 instead of 11 (as the current management account system does not send the August report) reports per year.
Also, if a manager or budget holder needed to check their budgets during the week, they can always send a special request to Management Accounts to run a report with the exact spending in real time, enhancing their ability to use the accurate budget to make management decisions.

The above proposed real-time framework would also benefit universities’ administrators by reducing administrative labour as they would be able to raise and track an order request online and on the same shared system stopping so, the use of many different spreadsheets and manual records to trace the financial data. Further, with the new electronic system, an order requisition raised by the administrators could be automatically escalated to a higher approval level after a certain time as following the feedback from the interviewees, at the moment there can be long waiting times before an order is approved or signed off.

In evaluating both existing and new system (frameworks) in terms of strength and weakness, it could be argued that for the existing system, the main strength is that the system is consistent and also, it has been used for several years by the CCCU staff, while the main weakness is the complexity of the current financial system (there are 17 different internal and external procedures at the moment) which causes the delay from Management Accounts in the distribution of the M/A reports to the School Managers and budget holders.

Looking at the new proposed system as an alternative, the main strength would be that as the all the financial data will be centrally stored and managed it can be accessed and managed in real-time from Management Accounts in order to prepare and distribute the reports to the School managers and budget holders at any time requested. In addition, it would benefit universities’ administrators by reducing administrative labour and it would allow managers and budgets holders to have a tighter budget control.
Thus, it might be argued that the new real-time management accounting system can be a useful and valuable tool to enhance the finance administration and meet industry requirements for large organisations. However, on the other hand, as already mentioned in the above literature by Hekmati (2011), the main weakness would be that the data can be lost due to software and hardware breakdown, or as a consequence of a security attack with the possibility of a change of data due to fraud and embezzlement, vandalism, sabotage, arson and malicious damage.
Chapter 6

CONCLUSION AND FUTURE WORK

Within the university context, accounting systems are gradually expanding, becoming increasingly complex, which can also result in new challenges and problems to those in management positions. In very fast changing times, universities are actively looking for methods to improve the efficiency and profitability of their performance. Thus, it is undeniable that there is much potential for IT to be incorporated in management accounting.

The current world is living on technology and no doubt, management accounting systems need technology to improve and enhance its functionality. By adopting correct system and technology in management accounting, organisations and management accountants are able to produce accurate reports to make decisions and investments. The application of IT in management accounting is becoming essential part of accounting to provide to the current needs of immediate business analysis and performance measures.

As seen in the above literature, the influence of computer software in accounting has raised positive opinions about the enhancement in efficiency and profitability in management accounting systems. Thus, well-designed accounting software could be an important tool for managers in large organisations to evaluate, interpret and draw attention to issues of budgeting and reporting. In the university context, the application of computerised accounting software to effectively manage the financial activities would benefit many stakeholders such as: administrators, managers and budget holders as well as students, external parties and suppliers.

The above results from the face-to-face unstructured interviews, show that both administrators and managers and budget holders support the need to have real time financial data available to enhance budget decisions as well as reduce administrative labour. Thus, after the analysis of the existing accounting information systems (AIS) at CCCU, the inefficiency of the current financial system and processes was demonstrated and explained in all its details.
As proved, the proposed CCCU Centralised Financial system could replace the 17 different internal & external financial systems and procedures. Thus, by merging all these different systems into a one electronic centralised financial software, could possibly reduce the complexity of the existing financial systems at CCCU as at the moment, administrators different systems (automated, semi-automated and manual) are used on the daily basis, which do not communicate with each other.

Using a centralised software as a formal control mechanism may help provide management with automated management control to actively monitor and intervene in the activities of their subordinates. Thus, as seen above, the development of a framework to model real-time management accounting system has addressed some of the current issues such as the delay in producing the management account reports and consequently the high gap between the management account reports and the actual “real time” expenditure, processed and recorded in mirror accounts by the Schools’ administrators.

Real-time updates enabled by the proposed centralised financial system, would help large organisations for better business planning and resource allocation, and would also help to optimize operational processes, minimize expenditures, and enable management to respond to issues immediately. In addition, the proposed framework has also suggested to increase frequency of the management accounts reports sent to managers and budget holders going from the monthly to a weekly distribution, and also benefited universities’ administrators by reducing administrative labour as they would be able to raise and track an order request online.

Technology, competition and the pace of business are changing the way in which companies think about internal management information as the provision of real-time data could give large organisations such as universities a competitive edge. The processes of producing and distributing all kinds of products and services are increasingly guided by electronic management information systems. Consequently, accounting must keep pace as electronic processes converge toward real-time management accounting of all day-to-day practices.
References


Appendix

Appendix_1 Set of questions for administrators from the professional service departments

1) Could you explain a little about your roles/responsibilities within the University?

2) How many Financial Systems and procedures do you use on your daily job? Please specify

3) Is the system/procedure that you use to process the spending automated, semi-automated or manual?

4) Do you need the training/support of a technical person to be able to use the financial system?

5) How long does it take to process an order from its request until an item or service is fully paid to the supplier.

6) In what format do you record the financial data?

7) When do you send the financial data to Management Accounts?

8) Do you think that the financial system that you use is too complex and difficult to use? If yes, why?

9) What is your perception and understanding towards an automated real-time financial system in the university?

10) What are the benefits that could accrue from the implementation of an automated real-time financial system?

11) In your opinion, what else could be done to improve the current financial system?
Appendix_2 Set of questions for the schools’ budget holders and managers

1) Could you explain a little about your roles/responsibilities within the University?
2) Do you know what are the financial systems and procedures within the university?
3) How do you keep track of the spending within your budget?
4) Do you know the exact spent against your budget as of today?
4) Do you need an extra support from an administrator to keep track of the spending?
5) When do you receive the reports from Management Account?
6) Do you know the potential gap between the management account reports and the actual “real time” expenditure?
7) In what format do you receive the Management Accounts reports?
8) Do you think that the reports from Management Accounts are too complex and difficult to use? If yes, why?
9) What is your perception and understanding of an automated real-time financial system?
10) What are the benefits that could accrue from the implementation of an automated real-time financial system?
11) In your opinion, what else could be done to improve the current university financial system?